ROCK PRODUCTS AND QUARRY

APR 5 1941

APRIL, 1941

Concrete Production at the Kingsbury Ordnance Plant . . . Sea-Water Magnesite Plant Is Improved . . . Crusher Fines in Bituminous Mixtures . . . State Lawmakers' Activities

LUDLOW-SAYLOR

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

for super-severe service

●

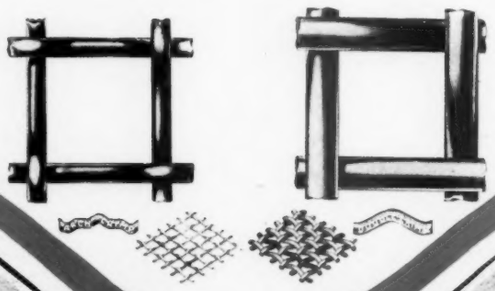
SUPER-HARD, SUPER-TOUGH, SUPER-STRONG

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

withstand abrasion longer—

endure vibration better—

resist fatigue to the utmost



The background at top of page shows the "Perfect" Double-Crimp Weave.

The small cuts in the center panel compare Arch-Crimp Weave and Double-Crimp Weave.

The border at foot of page shows "Perfect" Double-Crimp Steel Wire Cloth which has been hot-dip galvanized after weaving.

Samples on request.

The LUDLOW-SAYLOR WIRE COMPANY SAINT LOUIS

Lower Maintenance-Longer Life with LINK-BELT BUCKET ELEVATORS

Link-Belt engineers have had extensive experience in the design, manufacture and application of bucket elevators for varied service requirements. If your materials handling conditions require the use of a bucket elevator let Link-Belt show you the most efficiently performing size and type for your needs.

Refer to pages 862-916 of Link-Belt General Catalog No. 800 for complete engineering data, specifications and information on how to select bucket elevators.

LINK-BELT COMPANY, Chicago, Indianapolis, Philadelphia, Atlanta, Dallas, San Francisco, Toronto. Offices, warehouses and distributors in principal cities. 8475

Centrifugal Discharge Type
for General All-Around Service

Malleable iron or steel buckets mounted on chain or belt. Loaded by materials flowing into buckets, or by digging or scooping up under the foot wheel. The material is discharged by centrifugal action as buckets pass over the head wheel.

Perfect Discharge Type
for Fragile, Sticky, Powdered. Fluffy or Sluggish Materials

Malleable iron or steel buckets are carried between two chains, snubbed under head wheels to inverted position over the discharge chute. This provides a "perfect" or positive discharge of material. Ideally suited for handling materials which are sluggish in discharge.

Vertical Continuous Type
for Light, Fluffy or Pulverized, and Friable Materials

Steel buckets are usually used and are mounted continuously on chain or belt, and loaded by material flowing into buckets. Spillage is prevented by their close spacing, and at the sides and front by a loading leg. Inclined types (without casings) also available for sand, gravel and stone.

Vertical Super-Capacity Type
where Large Capacities are required

This type is suited for handling fines or large lumps, or both. Buckets are made of steel, similar to continuous type, but carried between chains in such a position as to hold the maximum capacity for minimum weight and space. Also made in INCLINED type (without casings) with head machinery independently supported.

A TYPE AND SIZE FOR EVERY SERVICE AND CAPACITY

PIT AND QUARRY, April, 1941, Vol. 33, No. 10. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.

For built-in economy

GET A FORD TRUCK

FORD TRUCKS ARE BUILT to do more work in less time at lower cost.

That means that *economy* is built right into a Ford.

There's *economy* in exclusive Ford engine features that keep maintenance costs way down.

There's *economy* in the long work-life and freedom from repairs of sturdy Ford bodies, frames and axles.

There's *economy* in the fact that Ford's big hydraulic brakes seldom need attention . . . that Ford's powerful semi-centrifugal clutch *stands up* in the hardest service.

There's an *extra economy* in the exclusive Ford Engine and Parts Exchange Plan that *saves money* on replacements . . . *saves time* for the Truck.

Your Ford Dealer can show you in detail how a Ford Truck's *built-in economy* will save *you* money. Ask him for an "on-your-job" test!

FORD
TRUCKS
AND COMMERCIAL CARS

Ford

HOW YOU CAN SCREEN BETTER

...with selective throw

• *Changes in screening conditions increase PLAT-O's value to you. If your materials are wet one day, dry the next—or if you change products on the same screen . . . then you need PLAT-O!*

PLAT-O's selective throw is the simplest mechanism on the market today.

The off-balance flywheels are engineered with the whole screen so it is impossible to overload to a point where the throw is affected to any measurable degree.

If your materials change, or if you feel that either a stronger or weaker throw could give you greater capacity or better grading or both, it is very easy to change the length of stroke.

Simply loosen the set screws of the inside pulleys on both ends of the shaft as illustrated and set them in different notches (just so both correspond). Then tighten the set screws, and start the screen.

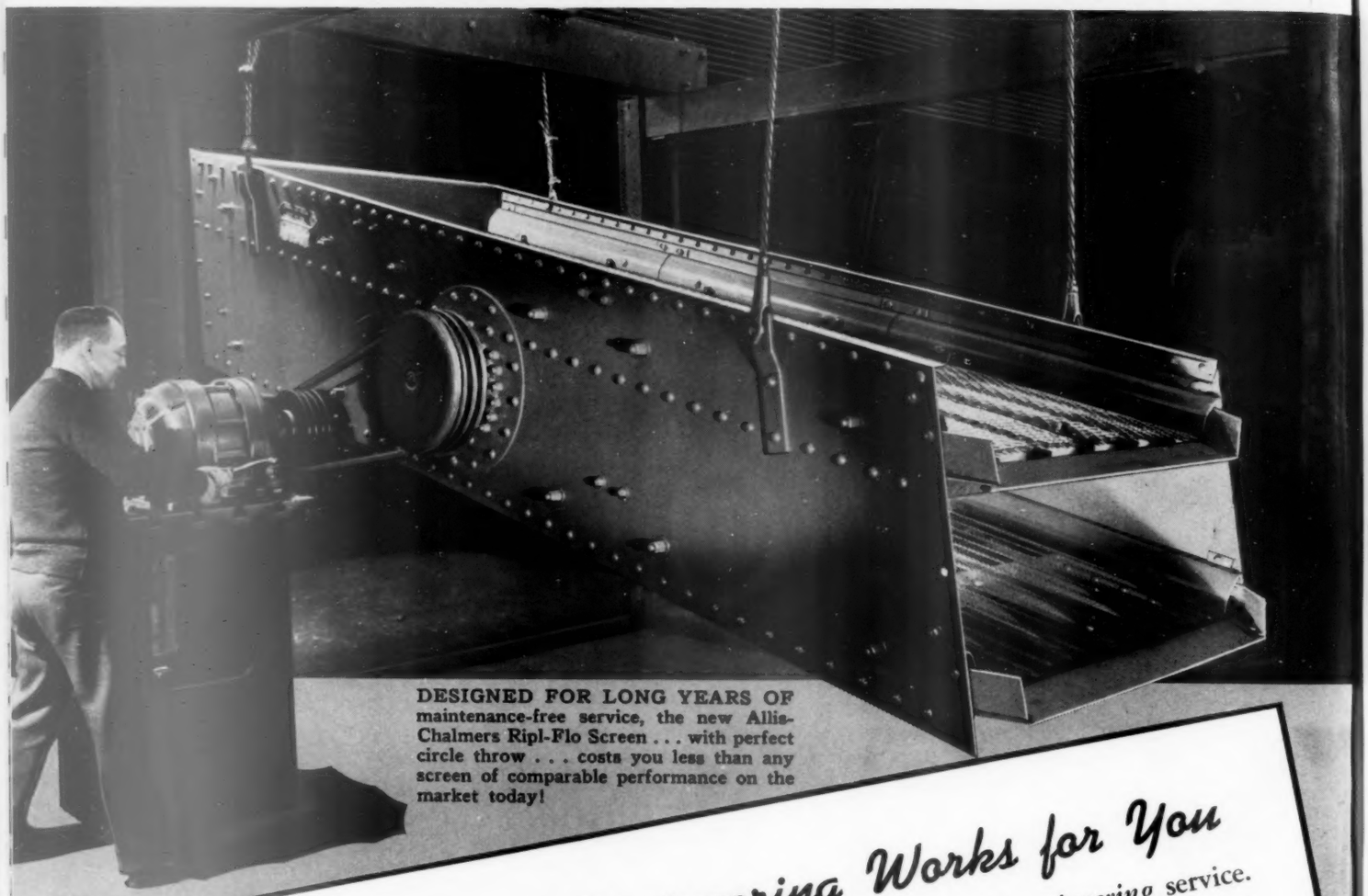
DEMAND THESE FEATURES

• Opposed Elliptical Throw ... Low Headroom, Accurate Grading, High Capacity • Selective Throw • Powerful Positive High Speed • Oil—Not Grease • Automatic Screen Cloth Tension—Each Deck Independently Changed • Vibration Fully Cushioned • Only Two Bearings • Lowest Power Requirements.

PLAT-O by DEISTER

DEISTER MACHINE COMPANY • FORT WAYNE, INDIANA

DO YOUR SCREENS



DESIGNED FOR LONG YEARS OF maintenance-free service, the new Allis-Chalmers Ripl-Flo Screen . . . with perfect circle throw . . . costs you less than any screen of comparable performance on the market today!

How Cooperative Engineering Works for You

As the world's largest manufacturer of rock and ore reduction machinery, Allis-Chalmers has amassed a tremendous interrelated engineering knowledge and experience that enable us, in cooperation with your own engineers, to analyze your individual problems from the viewpoint of your entire production process.

This is our *cooperative engineering* service. It is your assurance that the Allis-Chalmers equipment you buy will perform in perfect harmony with your other equipment . . . give you the teamwork so necessary to production efficiency. Why not let us give you full details?

ALLIS-CHALMERS A-C MILWAUKEE

Let ALLIS-CHALMERS COOPERATIVE

"GALLOP"?

Perfect Circle Throw of Allis-Chalmers Ripl-Flo Imparts Uniform Vibration to Each Square Inch of the Deck. Read the Story of This Remarkable New Screen that Costs You Less Than You Pay for Any Screen with Comparable Performance on the Market Today!

MANY OPERATORS HAVE had "galloping" screens in their plants . . . screens that shake the supporting structures and make uniform efficiency and screening results uncertain because of erratic material flow over the screen deck.

That's why the new Allis-Chalmers Ripl-Flo . . . with uniform circle throw . . . has gained such wide-spread acceptance. For Ripl-Flo's circle throw imparts uniform vibration to each square inch of the deck. Material doesn't slow down as it reaches the middle of the screen. You're sure to get exactly the right tonnage for a given angle . . . and get it with maximum screening efficiency!

Big Saving in Power Costs!

Equally important, the Ripl-Flo does not shake material . . . it *rolls* it over and over . . . practically eliminating blinding even on small sizes. And dynamic balancing also means lower power consumption for you . . . *only 60%* of that required by most screens of similar capacity!

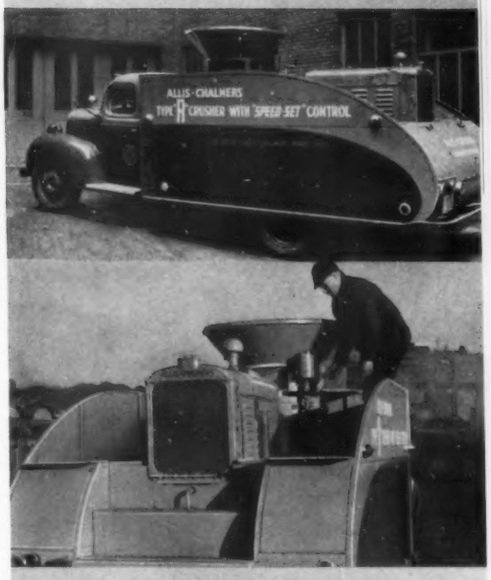
Because of this same dynamic balancing, the Allis-Chalmers screening specialists give you a screen with *smoother* operation. There's no rough period in starting or stopping . . . no lateral movement while running . . . no gallop!

Ripl-Flo Costs You Less!

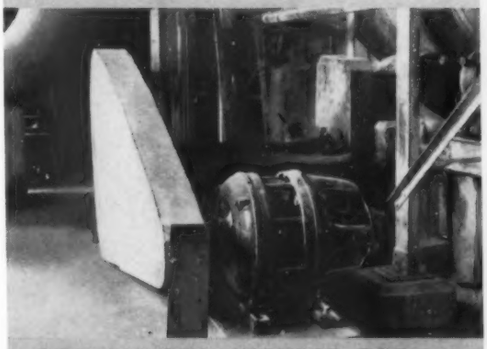
Best of all, because all superfluous parts are eliminated, you get the remarkable new Ripl-Flo Screen at a *cost that's actually less* than you pay for any screen with comparable performance on the market today!

For complete information, call the district office near you. Or write direct to Allis-Chalmers, Milwaukee, for your copy of Bulletin B-6151.

News of other Allis-Chalmers Products that cut your costs!



TO SHOW OPERATORS HOW THE new Allis-Chalmers Type "R" Crusher works on their own product, a No. 322 with "Speed-Set" Product Control has been mounted on this truck now touring the country.



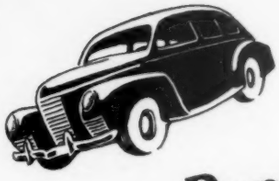
CONTINUOUS SERVICE FOR 18 years — that's the operating record of this 20 hp Allis-Chalmers Lo-Maintenance Motor driving a dryer in an Ohio Quarry.

WITH THE ALLIS-CHALMERS Double Screw Sand Washer, operators get a clean product with no bridging or channeling to slow down operations. Shown here is a 16 in. by 15 ft unit.

A 1378

E ENGINEERING *Cut your costs*

ATLAS MANASITE DETONATORS



Again, History Repeats Itself

WHEN hydraulic brakes were introduced as a forward step in automobile construction, they were called impractical, unsafe—undependable. Controversy raged. But trial in service—on every type of car, under every conceivable driving condition—proved their worth. Today, hydraulic brakes are standard equipment and taken for granted by the motoring public.

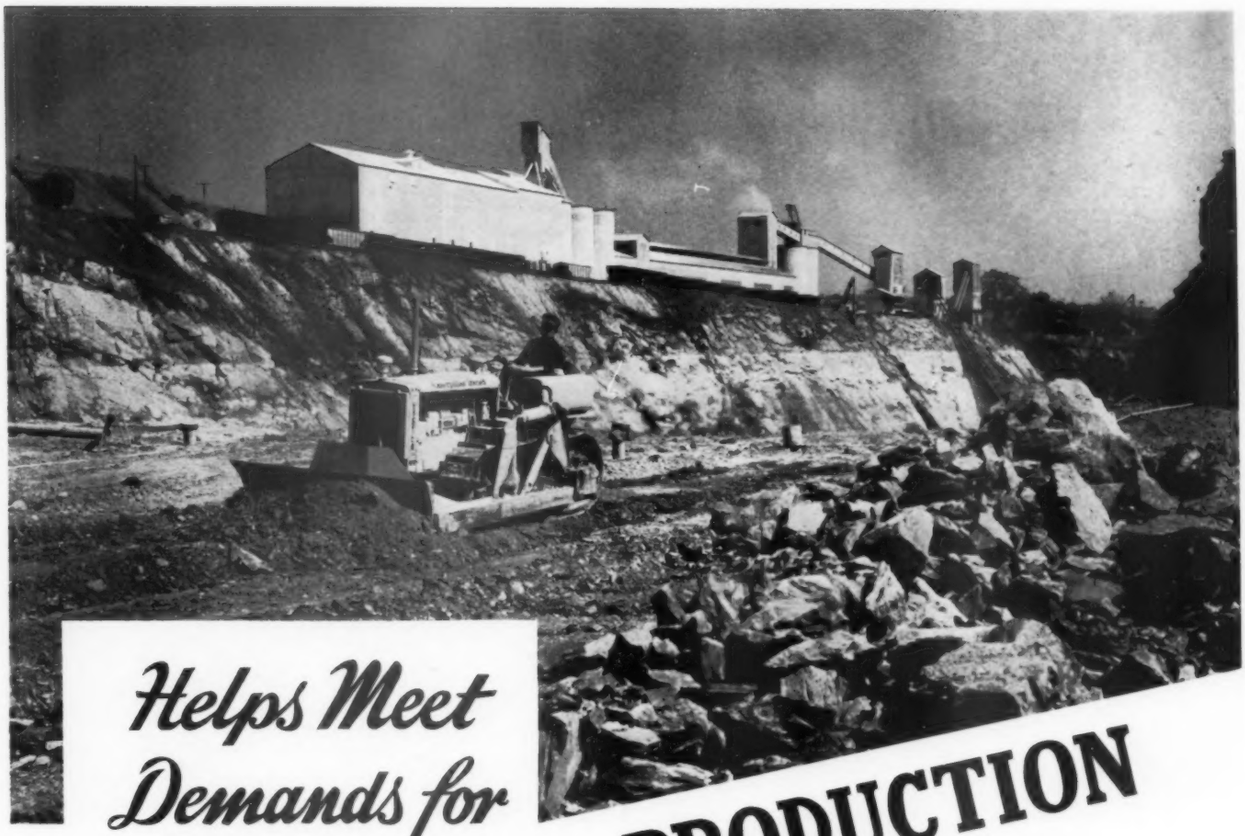
Years ago, Atlas began experiments with the use of hexanitromannite in blasting caps—a chemical less sensitive to impact and friction. As a result, three years ago came the commercial introduction of Atlas Manasite detonators with an increased margin of safety. Followed the inevitable question—are they dependable? History gives the answer: over 100,000,000 Atlas Manasite detonators already have been used . . . over 1¾ million on the Delaware Aqueduct alone!

Your Atlas representative will be glad to give you full details.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco



Helps Meet Demands for

INCREASED PRODUCTION

LA PLANT-CHOATE

Earth Moving Equipment

FROM now on, it's "all-out" for National Defense. The greatest possible output in the shortest possible time is the foundation for the entire program. That leaves no room for compromise on equipment that requires constant "nursing along" . . . or does its work the slow, hard way. Without guesswork or experimentation, LaPlant-Choate tools give you the right answer the first time.

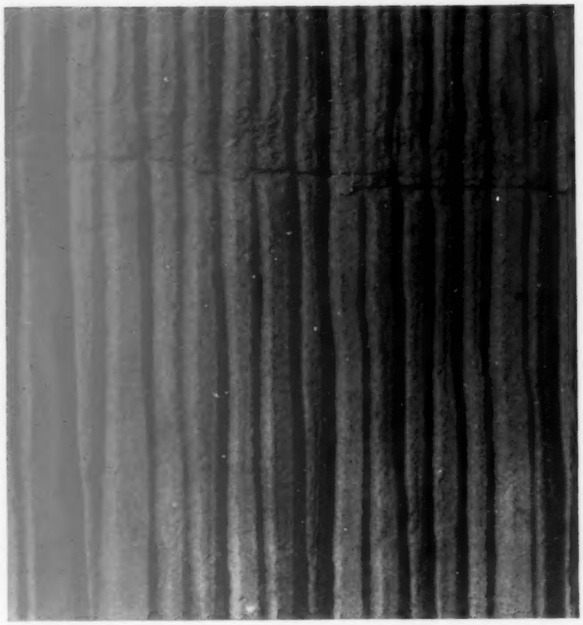
Don't let "bottlenecks" occur in your quarry. LaPlant-Choate Trailbuilders, Bulldozers, Rippers . . . mounted on "Caterpillar" Track-type Tractors . . . assure speed, extra capacity, dependability and economy in your earth moving operations. Scientifically correct design as well as low operating and maintenance costs have been proved on hundreds of jobs the world over.

And, after the strength and security of America is assured, your LaPlant-Choate equipment will continue to pay good dividends on your investment. Get full details today from your nearest LaPlant-Choate and "Caterpillar" dealer. Modernize now. Write or wire for Free literature.

LA PLANT-CHOATE MANUFACTURING CO. Inc.

CEDAR RAPIDS, IOWA.

DIMENSIONAL QUARRYING THE OLD WAY

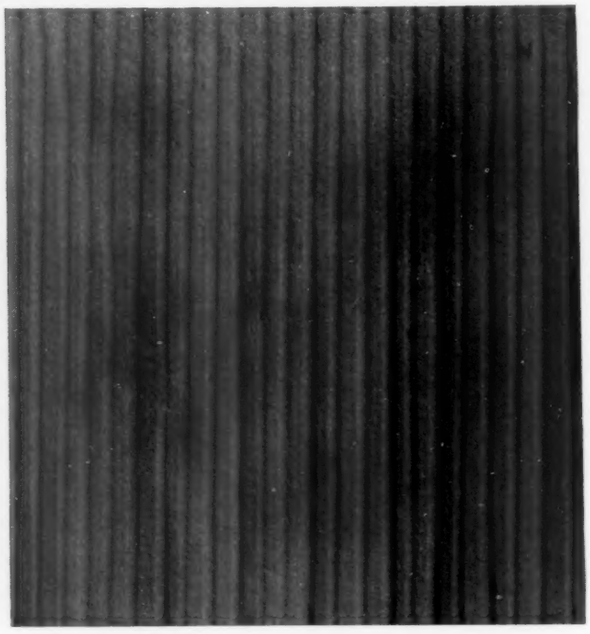


Disadvantages

Rock bits forged as an integral part of hollow drill steel rods are a constant headache to dimensional stone quarry operators. In granite formations gauge losses are so great that the hole must be "stepped-down" by using smaller and smaller gauges. Consequently the cores between the holes become progressively larger (see cut above) and must be "worried out" with broaching tools. Moreover, material losses are high because many uneven fractures are obtained.

Because it is necessary to frequently change bits, operators are forced to carry an enormous steel inventory.

DIMENSIONAL QUARRYING THE TIMKEN BIT METHOD



Advantages

TIMKEN Removable Rock Bits have taken the headaches out of dimensional stone quarrying because they drill constant gauge holes (see cut above).

Here is why they can do it. TIMKEN Bit gauge losses on the same footages obtained with forged bits are inconsequential because TIMKEN Steel and TIMKEN Bit design have very high resistance to wear. Thus when a new or reconditioned TIMKEN Bit begins to dull it is removed and replaced with another one of *identical* gauge. This results in constant gauge holes, simplification of subsequent broaching operations and even fractures with minimum material losses.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

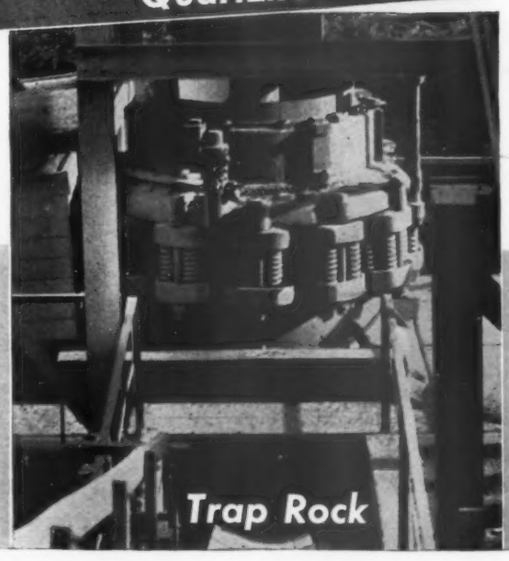
TIMKEN
ROCK BITS

SYMONS SHORT HEAD CONE
for making those minus ½ inch sizes

• • Still the world's outstanding crusher for fine reduction of all materials • •

Limestone

Quartzite


Trap Rock

Making minus half inch material is a field for which the Symons Short Head Cone is primarily adapted. That so many of the larger producers of stone, gravel and slag should standardize on this crusher is evidence of its superiority for this class of work. Producers engaged in making those finer sized materials for black top and other types of stabilized roads will find this crusher exactly suited to their needs. There is no guesswork in the production of these fine materials with Short Heads. Obtain just the sizes you require in quantities that meet your demands and at a crushing cost which will assure of greater profit by doing your fine reduction crushing with a Symons Short Head Cone.

Write us for further particulars on this Short Head Crusher, the solution to your fine crushing problems.

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LOS ANGELES
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Brooks LOAD LUGGER

TRADE MARK REGISTERED

MORE PAYLOADS »» Per Truck Per Day...

15 SECONDS for DUMPING or PICKING UP LOAD

Check up on your hand loading jobs and figure how much time is lost by trucks standing idle. While they are waiting to be loaded, your profits are wasting away.

You can stop those losses by equipping your trucks with Load Luggers, and operating with several buckets to each unit. Then you can haul and dump the buckets *continuously* while the workmen are filling the empties. Result: 50% to 60% saving on the average job.

●

Use the Load Lugger for quarry operations, supplying your crushers with a steady flow of material, also for road work and construction jobs.

●

Write for Catalog and ask about our Special Introductory Offer of two weeks' trial of Brooks LOAD LUGGER.

JACK-LEG FEATURE

Supports overhang when loaded bucket is hoisted, taking strain off truck.

CLEAR DECK SPACE

For hauling miscellaneous materials when bucket is not in use.

BUCKETS can be nested . . . convenient for carrying empty

ONE-PIECE BUCKET

With continuous welded construction.

OPEN-END BUCKET For special applications.

Brooks EQUIPMENT AND MFG. CO.

Distributors in all Principal Cities

104 Davenport Road **Knoxville, Tennessee**

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READY FOR *Spring* CONSTRUCTION ACTIVITIES ?

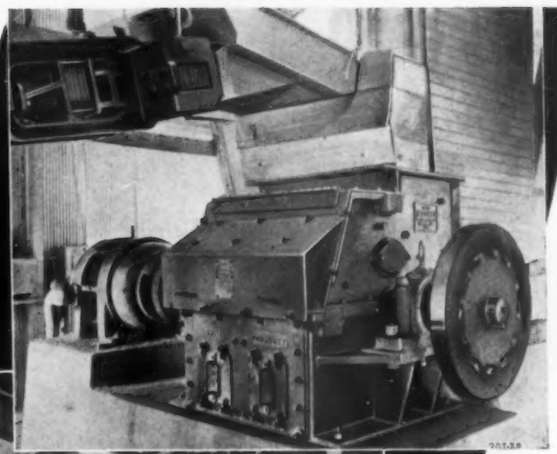
JEFFREY FACILITIES ARE AT YOUR SERVICE

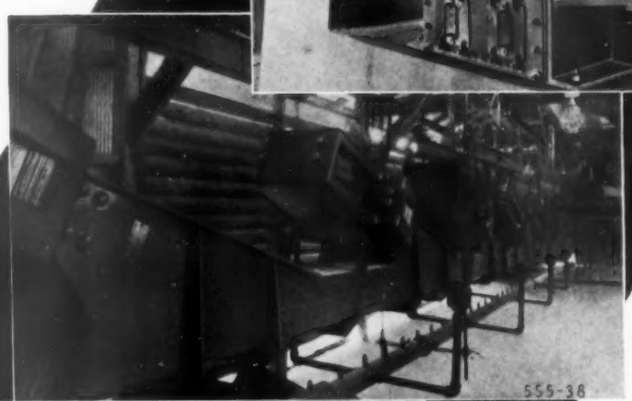
REPLACEMENT PARTS OR COMPLETE UNITS

Jeffrey equipment and plant engineering cover the entire stone products industry . . . sand and gravel, crushed stone and cement. In this broad line are . . . apron, belt and screw conveyors; bucket elevators, feeders and screens; sand dewaterers, portable conveyors and loaders; crushers and pulverizers; products, such as chains, sprockets and belt idlers for replacement purposes.

Since 1877, Jeffrey has established a reputation for fair dealing and the ability to provide a practical and economical method to handle or reduce your material. The experience we have gained during these years of serving we will be glad to pass on to you.

When you are thinking of equipment which will give long service and maximum economy . . . think of Jeffrey and BE SURE.





555-38

low: Jeffrey-Traylor pe 300 and 350 aytrols accurately portioning two different materials. They e remotely controlled by operator. nd for details on ffrey Waytrol ders.

It is impossible to show everything Jeffrey makes for your industry but we have selected a few typical installation views to give you a fair idea of our facilities and broad line of improved products.

Beginning at the top: A Jeffrey-Traylor electric vibrating feeder delivering material at controlled rate to a Jeffrey swing hammer pulverizer—an ideal combination. Next is shown a Jeffrey-Traylor electric vibrating cooler taking discharge from kiln at 1200 F. and delivering material at 150 F. Jeffrey-Traylor electric vibrating screens and a Jeffrey steel apron conveyor are shown in the two small views at the left.

For the sake of economy and efficiency . . . for maximum freedom from costly and annoying maintenance problems in processing and handling . . . call on Jeffrey engineers. They rely on experience.

THE JEFFREY MANUFACTURING COMPANY

917-99 North Fourth Street. Columbus. Ohio

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- **Complete, accurate and up-to-the-minute Directory.**
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The compilers of the 1941 Directory Section of Pit and Quarry Handbook have labored painstakingly to build an accurate list of all known American producers of nonmetallic minerals. Each new listing has been carefully scrutinized for accuracy and completeness. Previous listings have been revised, checked, double-checked. All appear two ways—(1) alphabetical by companies, (2) geographical by plants. It gives you company names, officers, location of plants, size or capacity, and names of the men who do the buying. Select the complete Handbook and Directory, or the convenient, flexibly-bound Directory alone. Now ready for distribution. Order NOW to insure getting one of the first copies. Use coupon below . . . we'll bill you after you get the book.

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Company .....

Town ..... State.....

3 yd.-a-min. Model 75W

Heavy duty Model 77C—a general service 3 yd.-a-min. creeper machine. Also with pneumatic tires.

Gravel Bank Special "80" with avalanche protection and cobble guard plates. Rated at 3 to 5 yd. in heavy duty digging.

8 yd.-a-min. "135"—the biggest, heaviest (24,400#) fastest Loader made. A money maker with a fleet of big trucks.

SETTING THE PACE IN '41 LOADERS

5 yd.-a-min. Pneumatic Tired Model 80 with Avalanche protection.

BIG new machines on pneumatic tires. Power for excavating and heavy duty digging—on creeper treads. Transmissions designed for Loader duty; broad-face gears and big load-carrying clutches—all enclosed and running in a bath of lubricating oil. Patented Haiss feeding propellers, still out in front as the simplest, strongest and most effective self-feeding device for loader use. Slow-speed crowding according to the service intended. Mobility on pneumatic tires; soft-ground traction on creeper treads. Gasoline, electric or diesel power . . . Whatever your job you MUST check up on the 1941 series Haiss Loaders.

Catalogs, prices and operating data are yours for the asking.

CLIP THE COUPON

HAISS

GEORGE HAISS MFG. CO., INC.
142 Street, Canal Place, New York, N. Y.
Please send me complete information on ☐ 3 yd. ☐ 5 yd. ☐ 8 yd.
HAISS Loaders for _____
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My Name..... .... Title.....

Company Name .....

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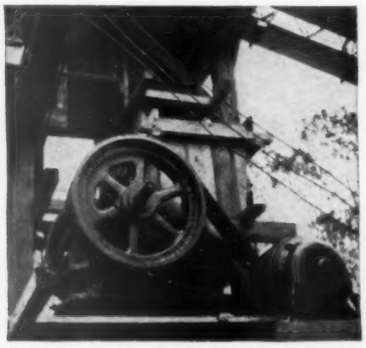
We Produce.....

NEW NAVAL AIR BASE
NEEDS 370,000 YDS. SAND AND GRAVEL

Under hopper with rail-bar grizzly, 30″ x 5′6″ *Telsmith Plate Feeder* regulates flow of material onto belt conveyor feeding scalping and crushing plant.



Feed conveyor discharges to Telsmith Rotary Grizzly and the plus 4″ material that it rejects is crushed by 18″ x 30″ *Telsmith Roller Bearing Jaw Crusher.*

Everything passing No. 450 *Telsmith Rotary Grizzly* flows over 5′ x 10′ *Telsmith Single Deck Pulsator.* Minus 2½″ goes to washing and screening plant . . .

THIS TELSMITH PLANT
RUNS 20 HOURS A DAY TO SUPPLY IT

. . . and the oversize from the Telsmith single deck Pulsator vibrating screen (2¼″ to 4″) goes through a No. 36 *Telsmith Gyrasphere Crusher.*

Both crushers discharge onto a return conveyor and, at point of transfer to main conveyor, a 3′ x 8′ *Telsmith Double Deck Pulsator* removes fines.

60″ x 18′ *Telsmith Standard Washing Screen* scrubs and sizes gravel. 48″ x 24′ and 36″ x 20′ *Telsmith Sand Drags* wash and dewater sand.

The Navy's new 25 million dollar air base at Quonset Point, R. I., will require about 370,000 yards of washed sand and gravel. This aggregate is being furnished by the Boston Sand & Gravel Co. of Cambridge, Mass., with a brand new and completely modern Telsmith Plant located near East Greenwich, R. I.

Telsmith engineers, in co-operation with the Boston Company officials, designed the plant especially for this job, and all major equipment was furnished by Telsmith. A capacity of 150 T.P.H. was figured but the plant produces as high as 250 T.P.H. Average production is 200 T.P.H. of Navy 1″ and 2″ aggregate and concrete sand—4000 tons per 20-hour day, with plant operating at times at temperature as low as 16° F.

For dependable advice and quick service coupled with the best in equipment, bring your problem to Telsmith.

Write for descriptive Bulletin G-15

SMITH ENGINEERING WORKS, 504 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

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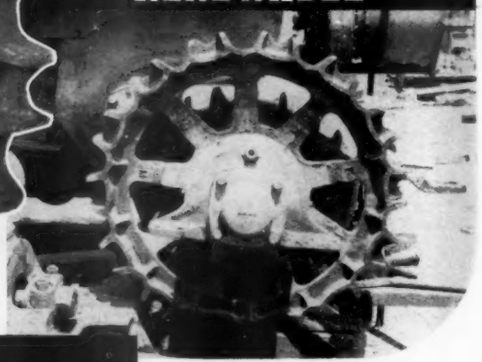
SPROCKET RIMS

MANGANESE STEEL RENEWABLE



Save those worn drive sprockets with renewable Alloy-Manganese steel rims. Heat-treated for long service with just the right toughness to guard from breakage. For Caterpillar Tractors. Stock shipments. Easily welded.

ALLOY STEEL & METALS CO.

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Mfrs. of PACIFIC JAW CRUSHERS Alloy-Manganese Steel CRUSHER JAWS and MILL LINERS • PACIFIC SLUSHING SCRAPERS and SHEAVE BLOCKS • PACIFIC ROCK BIT GRINDERS • CRAWLER SHOES and dependable Machinery Wearing Parts

Give Longer Life to Tractor Sprockets

DEMPSTER DUMPSTER

THE ORIGINAL BUCKETRUX

The New Model AP (Automatic Pickup) DEMPSTER-DUMPSTER leads again in the latest development in the detachable bucketrux field. A forked lift eliminates the lifting chains on the buckets. Pickup, carrying, dumping and return are speeded up, bringing even greater efficiency and lower cost to this modern hauling method. DEMPSTER-DUMPSTERS are supplied in sizes ranging from 1½ to 6 cubic yards . . . capacities 4,500 to 12,000 lbs. pay-load . . . in Drop-Bottom, Skip Type, Tilt Type and enclosed Buckets.

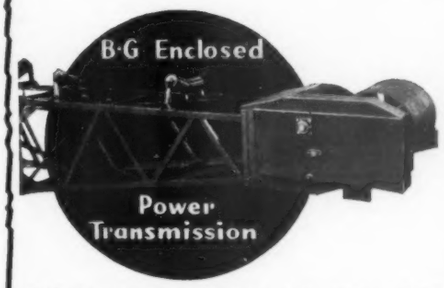
Skip Type Container in carrying position.

Drop-Bottom Bucket in dumping position.

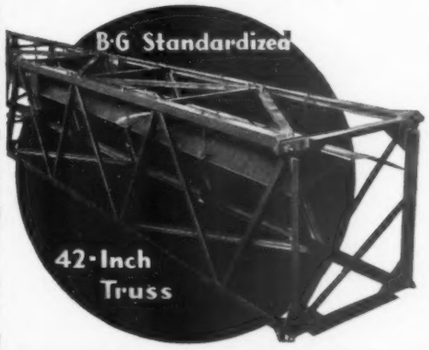
Investigate . . . Check with the Operators Who Use Them . . . Write for Details of Our Trial Offer

DEMPSTER BROTHERS, Inc. KNOXVILLE, TENNESSEE

Via Barber-Greenes



B-G Standardized Units include 24" and 42" deep Steel Truss, Enclosed Power Transmission, Head End Drives, Wrap Drives, Various Types of Take-Ups, A Frames, Walkways, etc. All unit parts and assemblies are accurately rated, giving the individuality of a "tailor made" conveyor plus the many additional advantages of standardization.



BELT conveyors offer by far the cheapest means of handling bulk materials. Barber-Greenes offer many additional advantages.

Having Pre-Engineered Standardized Unit Parts and Assemblies, the B-G Sales Engineer is able to make a quicker, more accurate price estimate, the Engineering Department is able to make a quicker, more practical layout.

This B-G Standardization lets us carry the parts in stock for practically any conveyor requirement — giving prompt shipment.

Erection is tremendously speeded up and simplified, and perfect alignment is assured.

B-G Standardization allows the addition of standard accessories later, and Barber-Greene Standardized Sectional Construction permits unequalled change of set-up to meet changing conditions.

B-G Carriers are recognized for their excellent design and performance records. They are available with plain, ball, or roller bearings. If you are replacing carriers or erecting your own conveyor, investigate B-G Carriers.

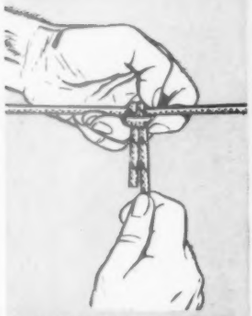
Solving your handling problems is our business.

Standardized Material-Handling Machines

BARBER GREENE

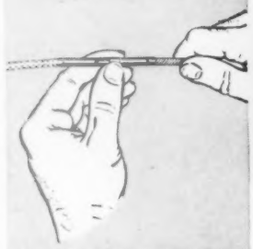
Aurora, Illinois

1. Tie through cartridge.



2. Half hitch branch to main line.

3. Connect main line lengths with *square* knot.



4. Fuse and cap on end of main line.

IMPORTANT

Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.

Shooting the toe-profitably

With Primacord, you can detonate a large number of small under-cut holes placed at very close intervals—a very profitable feature when you're shooting the toe in conjunction with well drill holes.

Primacord-Bickford is an insensitive detonating fuse. Its core of PETN, within a flexible, waterproof textile cover, carries the detonating wave at nearly 4 miles per second. Yet the fuse cannot be exploded by fire, friction, or any ordinary shock but must be detonated with fuse and cap or electric blasting cap.

PRIMACORD BICKFORD
Detonating Fuse

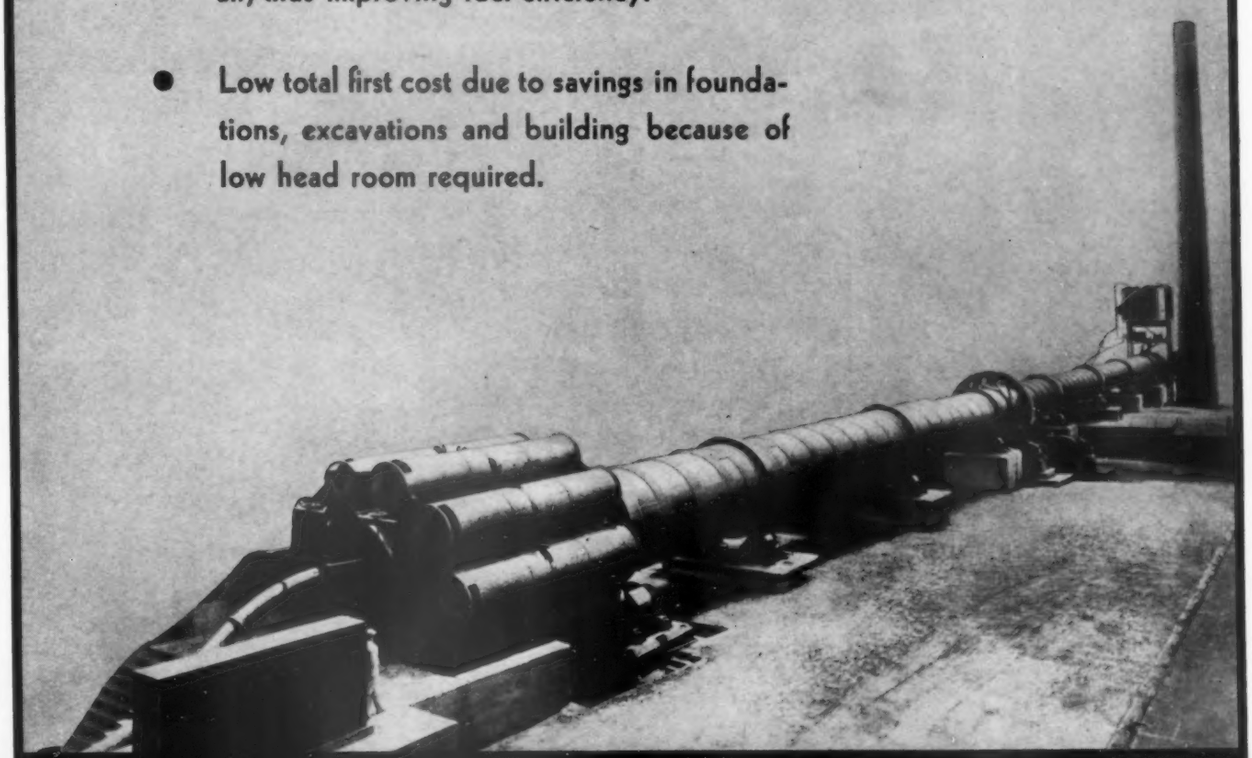
PB31

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONN.

Makers of Cordeau-Bickford Detonating Fuse—and Safety Fuse since 1836

UNAX ROTARY KILNS

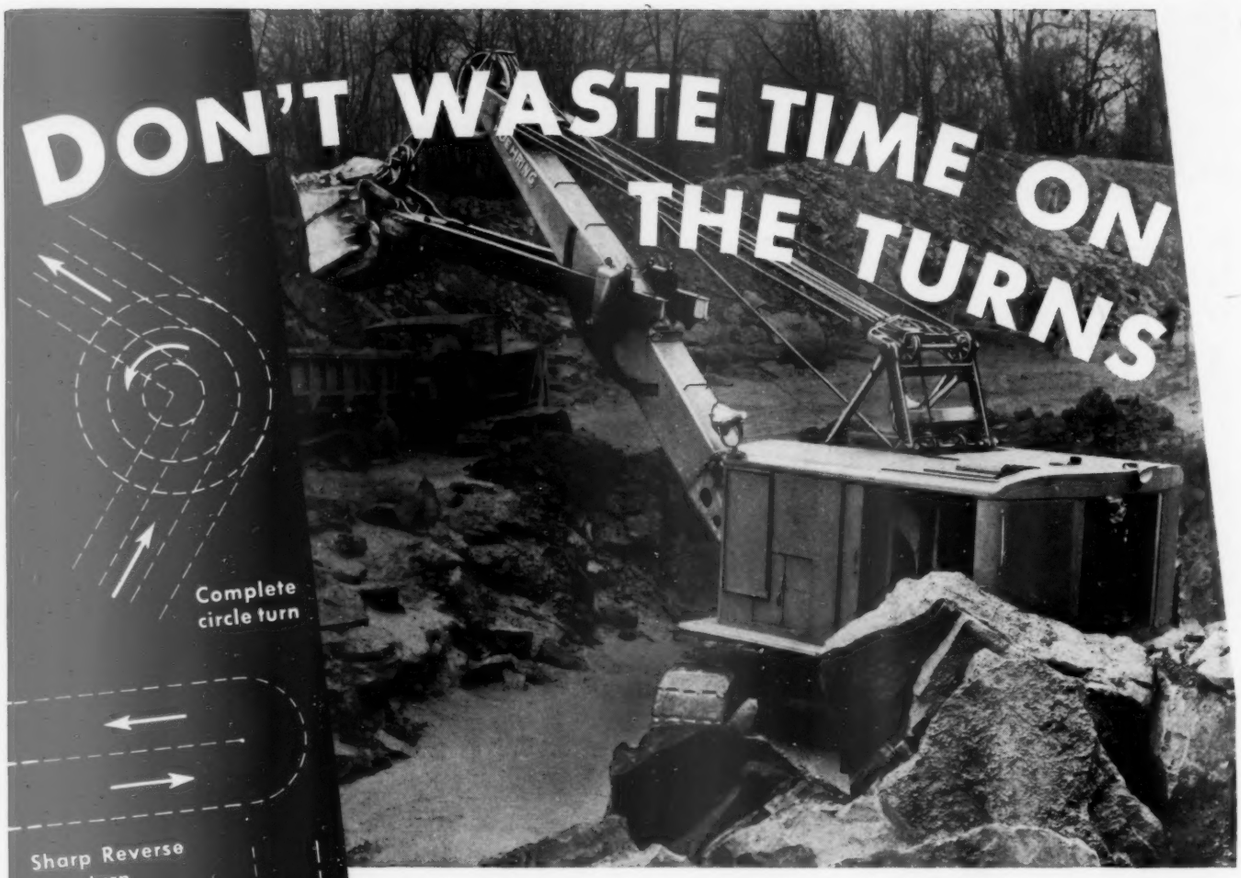
- Simplicity of design, giving low operating and maintenance costs.
- Integral with kiln, avoiding cold air infiltration, and requiring no extra motors or blowers, resulting in substantial power savings.
- Effective quick cooling. Preheats combustion air, thus improving fuel efficiency.
- Low total first cost due to savings in foundations, excavations and building because of low head room required.

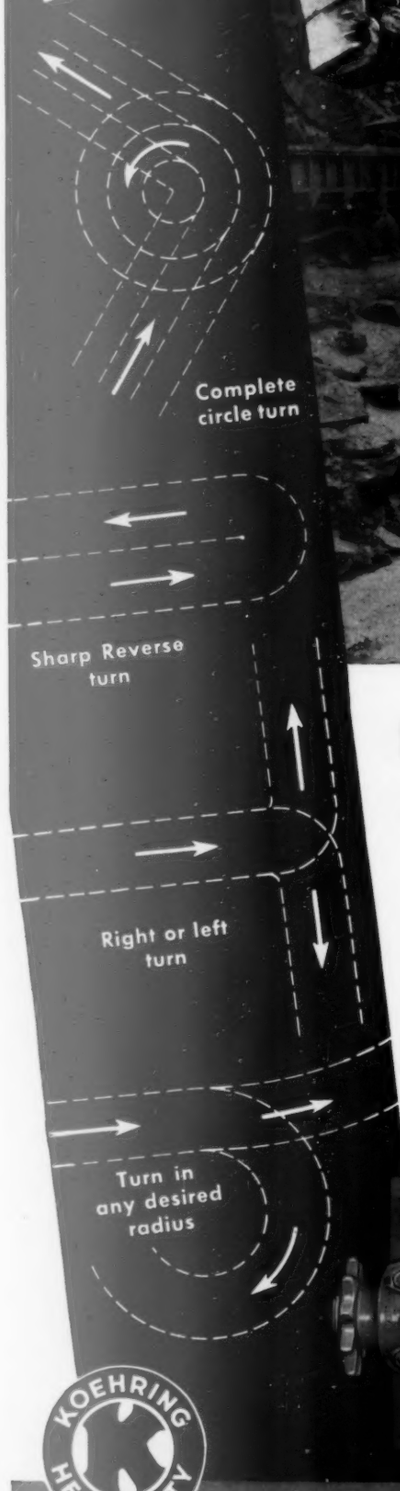


F. L. SMIDTH & CO.

60 EAST 42ND STREET — CEMENT ENGINEERING CEMENT MACHINERY — NEW YORK, N. Y.

DON'T WASTE TIME ON THE TURNS



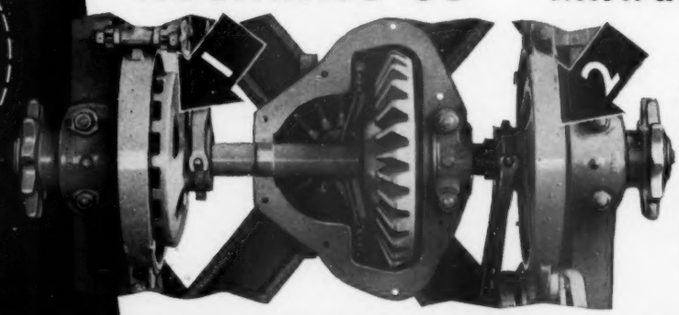


FULL SPEED AND POWER AHEAD—

Koehring does not need to "jockey", maneuver or make time-consuming, unnecessary moves to reach any section of the cut. Koehring travels the shortest way to the loading point. Turns are made directly . . . on grade or level . . . ***saving time!*** Tight places are no hindrance to a Koehring.

Watch a Koehring move and see the difference.

KOEHRING CO • Milwaukee



1. Positive jaw-clutch on ends of shaft engage for full power application with friction clutch control.

2. Positive brakes, controlled by lever, on end of shaft hold one or *both* crawlers as required.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

THE LONG AND SHORT OF REPUBLIC CONVEYOR BELTING

ORDER REPUBLIC PRODUCTS FROM YOUR DISTRIBUTOR

Long on dependable, efficient service—short on cost per ton hauled, operating difficulties and upkeep. In general terms, that is the story on the performance value of Republic Conveyor Belting. Products of one of the most extensive programs of research and experiment ever conducted for the advancement of this type of equipment, these carefully constructed belts have set time and tonnage records in a wide variety of applications. Whatever your requirements, let your nearest Republic Distributor recommend a type and grade of Republic Conveyor Belting for your consideration. REPUBLIC RUBBER DIVISION OF LEE RUBBER AND TIRE CORPORATION, YOUNGSTOWN, OHIO.

REPUBLIC RUBBER

LEADERSHIP IN POLICY PRODUCT AND PERFORMANCE

HOSE • BELTING • PACKING • MOLDED PRODUCTS

REASONS WHY *You can get more Hole*

FOOTAGE per day not only depends on the amount of energy expended by the tools on the bottom of the hole, but also upon the type of blow struck.

The Bucyrus-Erie 29-T's regular drilling rate is 50 strokes per minute when the travel of the tools is 44 inches. No other machine we have seen is able to equal this speed, this travel, nor carry the heavy tools that the 29-T will carry. This alone means a threefold increase in the work done for you per — greater production — more tonnage per drill.

Add to this the benefits of the new improved "drilling action" of the 29-T and you can see why these drills are pounding out record footage hourly under every condition. The 29-T with its rubber shock absorber at the crown sheave and its rubber insulated sheaves has a live, sharp penetrating blow with a quick upswing and thus takes advantage of the vibrations set up in the rock by the drill point. It doesn't let the dead weight of the tools rest on the bottom for a small fraction of a second to "choke" the helpful, shattering vibrations.

Let the 29-T increase your daily footage with more strokes per minute, a greater travel of tools, capacity for carrying heavier tools, improved drilling action and faster moves and setups. Write for the 29-T bulletin today.

BUCYRUS ERIE

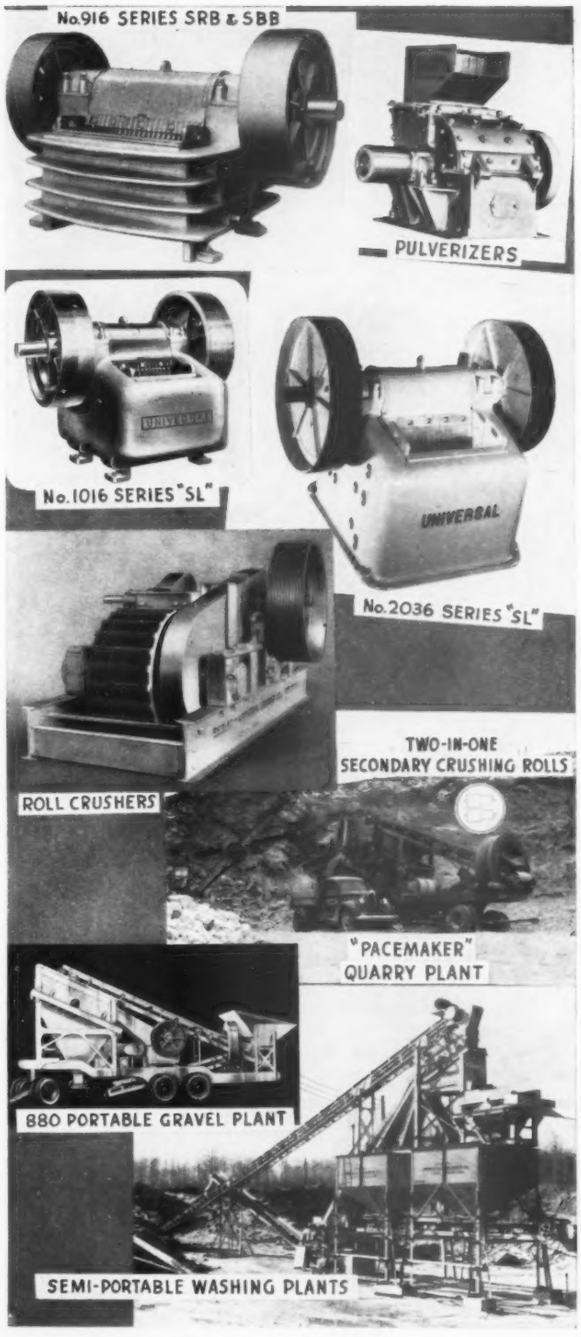
29-T

H-27

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

These times demand UNIVERSAL
CRUSHING EQUIPMENT

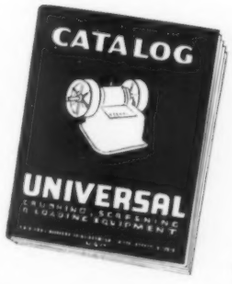


- There's lots of work to be done in a hurry—training camps, defense projects, new roads and road improvements to handle accelerated traffic, housing projects—it's surely no time to use obsolete equipment and make-shift set-ups.

- "Get in and pitch" with Universal profit-proved equipment. It's geared to the times. There's a Universal Crusher, Pulverizer and Stationary or Portable Plant just suited to your needs that will crush your material any size you want it, wherever you are, faster and at lower cost than any other equipment built to do the job.

- Name any equipment in this complete line and we will show you production and operating cost figures that will convince you if you know anything about the stone and gravel business—not just isolated cases, but testimony aplenty from the roll call of Universal customers.

Up-to-the-minute equipment for high production and economical operation is detailed in this 60-page catalog—send for your copy today!



"Don't get caught short." Demands are heavy — plan your purchases now. Universal field engineers and sales-service representatives in most cities will make helpful recommendations.

UNIVERSAL CRUSHER COMPANY, 619 C Ave. West, Cedar Rapids, Iowa

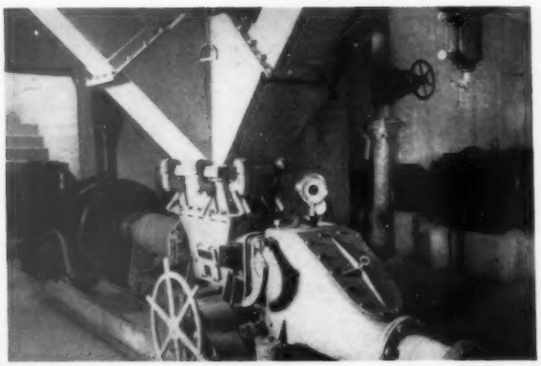
UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

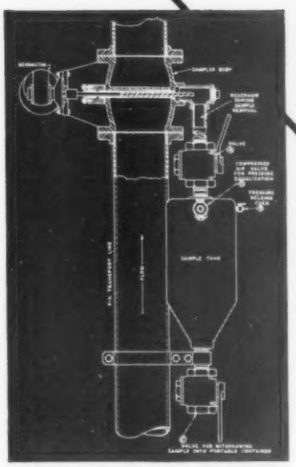
Leadership

Pit and Quarry in March carried more advertising than all other magazines in the *rock products* and the *concrete* field combined. This convincing evidence of leadership is the result of Pit and Quarry's complete circulation coverage, proved reader preference*, and high editorial standards. The wise advertisers spend their appropriation where it will accomplish most . . . and avoid duplication . . . in Pit and Quarry.

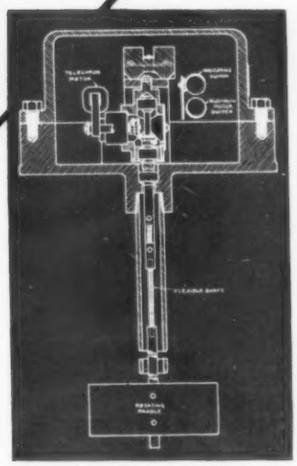
* Ask to see a copy of the results of this impartial readership study conducted by a nationally-known independent research organization.



Fuller-Kinyon Conveying Systems, built in both stationary and portable types.



Fuller-Anderson Sampler for continuous sampling of dry pulverized materials.

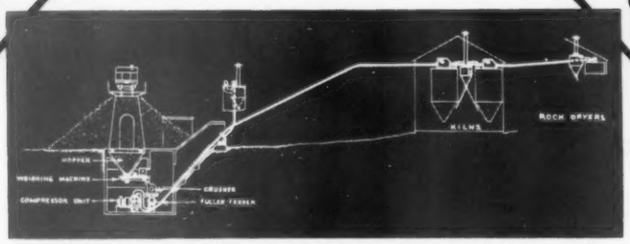


Material-Level Indicator, for controlling high and low-level limits of material in bins.

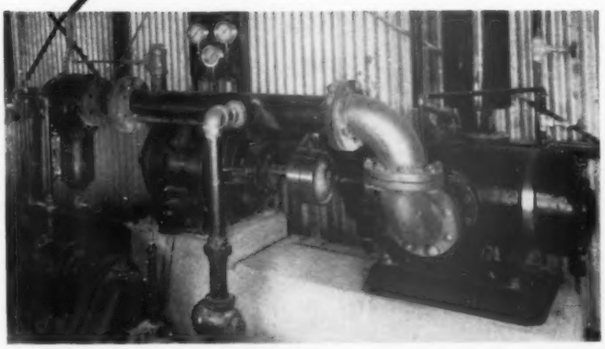
COST SAVING EQUIPMENT FOR THE CEMENT PLANT BY FULLER

Fuller Rotary Feeder for dry pulverized materials.

Fuller Rotary Gate Valve.



The Airveyor Pneumatic Conveying System, conveying crushed coal to kilns and rock dryers.

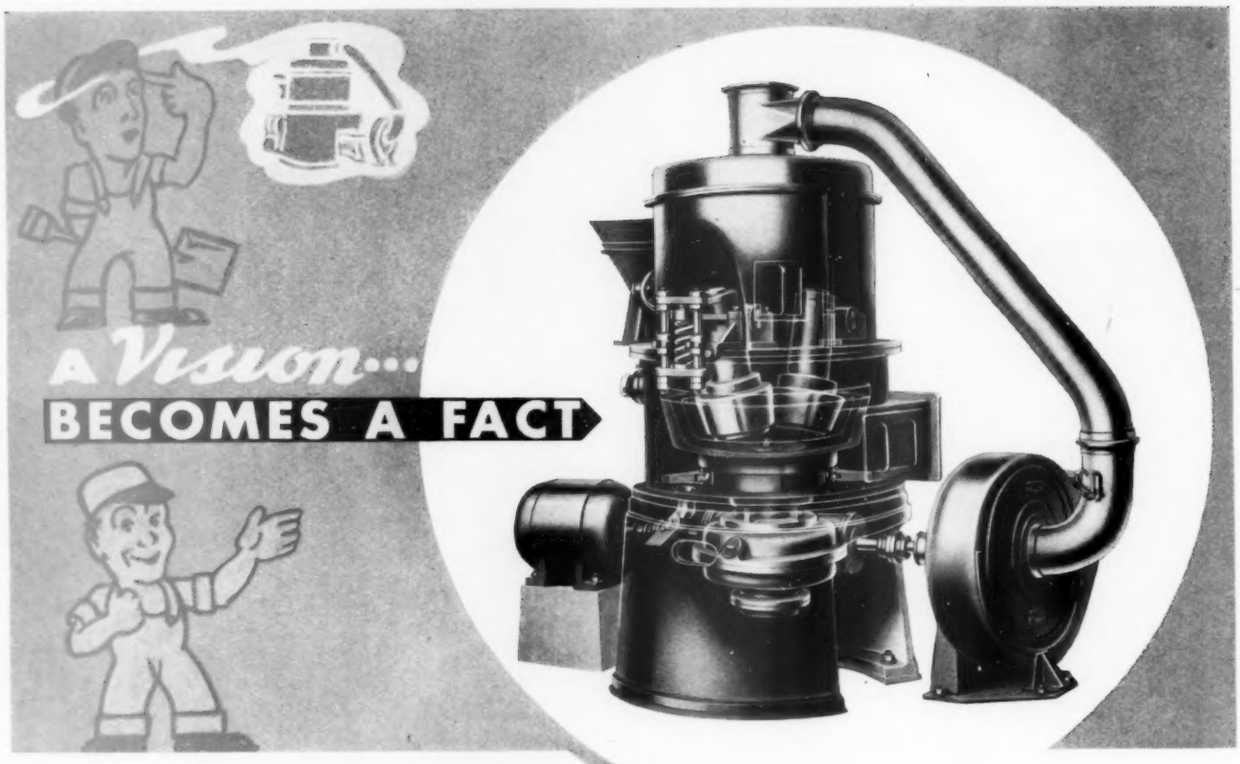


Fuller Rotary Compressors, built in single and two-stage types, capacities to 1800 C.F.M., 125-lb. pressure.

Fuller Air-Quenching Coolers for clinker, lime, ores, and other similar materials.

FULLER COMPANY - CATASAUQUA, PA.

CHICAGO—Marquette Bldg. SAN FRANCISCO—Chancery Bldg. G-21



RAYMOND BOWL MILL

...with these... OPERATING FEATURES

What kiln operators have had in mind as the ideal firing unit becomes the "real thing" when the Bowl Mill is installed on rotary kilns.

It cuts coal preparation costs to new low figures . . . maintains a uniform fineness at all feed rates . . . boosts kiln capacity and improves production of lime and cement.

The popularity of the Bowl Mill among producers is shown by the greatest demand and sales records for Bowl Mills in the history of Raymond equipment . . . fully thirty per cent, repeat orders.

BOWL MILL

Easy Control of Output—Mill capacity may be varied by small increments from minimum to maximum with practically constant fineness of grind.

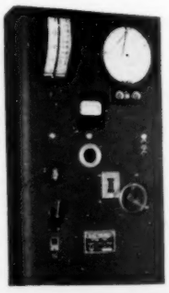
Simple Fineness Adjustment—Classifier vanes of the separator, and adjustments of grinding rolls, are conveniently located outside the mill.

Positive Lubrication—To assure continuous operation at high efficiency, automatic oil circulation is provided to main bearings, and the gear mechanism runs in a bath of oil. Operating parts lubricated from outside the mill.

Quiet Operation—With no metal-to-metal contact between grinding surfaces, pounding and vibration are eliminated. Worm gear drive with ball bearings, and main shaft with roller bearings, make the mill practically noiseless.

Low Power Consumption — Tests show 25% or more in power savings due to extremely low friction losses and high pulverizing efficiency.

Thermostatic Control — Panel board includes all controls for pressure, draft and rate of feed. Provides visible graphic record of mill performance.



For performance data and construction details, ask for Catalog # 43.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch Street **CHICAGO**
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

PIT AND QUARRY

Vol. 33 APRIL, 1941 No. 10

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H. W. BAUMGARTNER
President

STANLEY A. PHILLIPS
Vice-President and Directing Editor

Field Editor:
W. E. TRAUFFER

Assistant Editor:
HARRY F. UTLEY

Circulation Manager:
W. T. KLUSSMAN

Advertising Manager:
JAMES E. MONTGOMERY
Telephone HARrison 9357
Chicago, Ill.

Eastern Advertising Manager:
W. A. WILSON
Room 430, 122 East 42nd St.
Telephone CAledonia 5-4438
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Central Advertising Manager:
D. R. EGBERT
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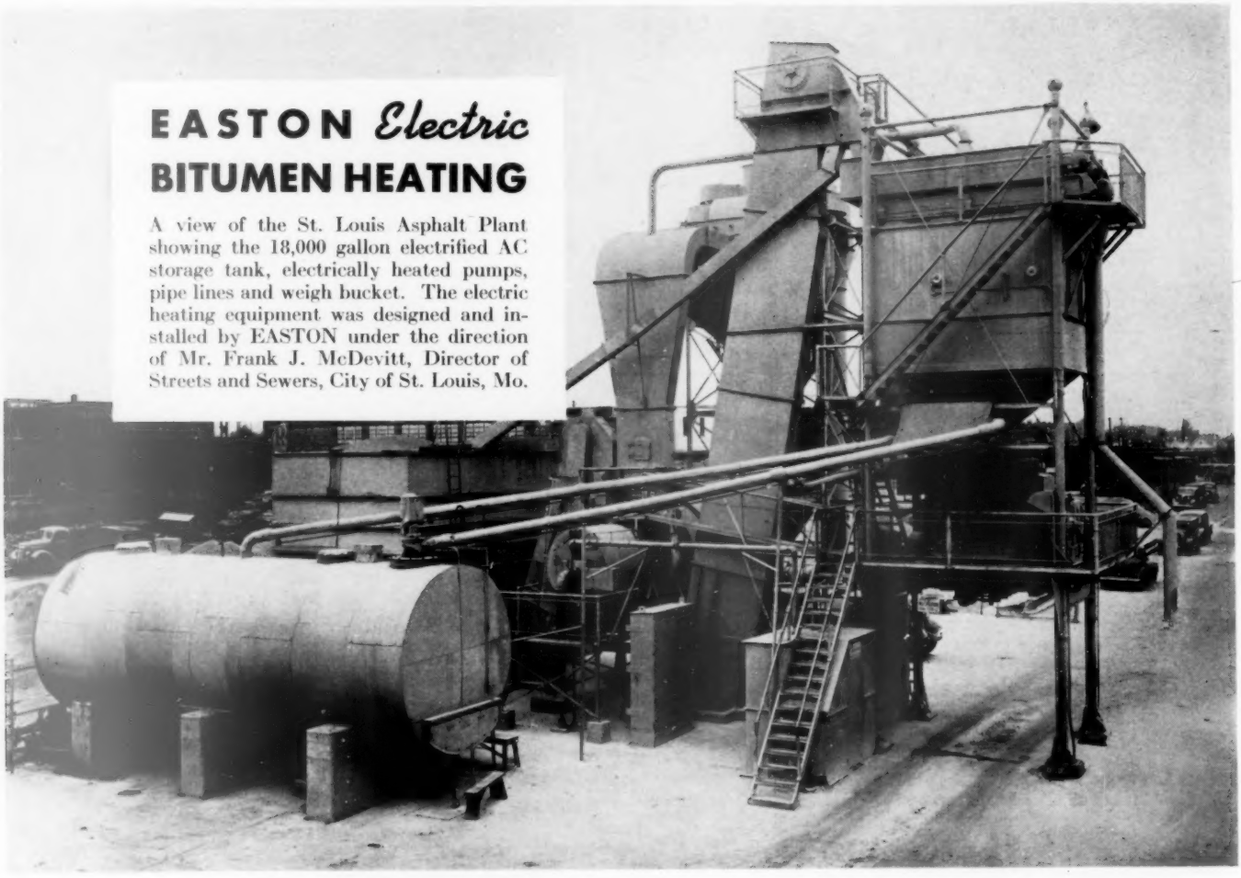


EASTON *Electric* BITUMEN HEATING

A view of the St. Louis Asphalt Plant showing the 18,000 gallon electrified AC storage tank, electrically heated pumps, pipe lines and weigh bucket. The electric heating equipment was designed and installed by EASTON under the direction of Mr. Frank J. McDevitt, Director of Streets and Sewers, City of St. Louis, Mo.

at the ST. LOUIS MUNICIPAL PLANT

ELECTRIC HEATING *for as little as* $2500

Several asphalt paving plant operators have reduced fuel and operating costs by making a *partial conversion* to Electric Heating. In some cases the operating tank, with a capacity equal to daily asphalt demand, has been electrified at an approximate cost of $2500.

RESULTS: steam, needed only for supplementary heating, can be at a much lower pressure (50 lb. Gage); boiler operated only when the plant is operating; savings in fuel and labor; a better bituminous product. The complete conversion to Electric Heating will follow step by step. Let us tell you more about *partial conversion*. Write. . . .

Writing in January of this year, Mr. Frank J. McDevitt, Director of Streets and Sewers, City of St. Louis, said:—

"Before installing the Easton-Clarmac electric asphalt heating system, we produced our anti-skid paving mix with two plants using steam. In 1939 the combined output of these two plants was 40,000 tons. In the first eight months of operation, the Easton-Clarmac installation produced 70,000 tons of a better, more uniform product. Electric heating gave us accurate and fully automatic temperature control, with no danger of coking or carbonizing the asphalt. At the same time it resulted in an amazing operating cost reduction.

"Before installing the Easton-Clarmac system we laid a total of 4,000,000 square yards of homogenized paving in a period of seven years. With the increased production made possible by electric heating we have been able to lay 1,000,000 yards of an improved product in eight months."

Among the outstanding advantages of Easton-Clarmac heating are—entirely automatic temperature control—an instant supply of bitumen at all times—considerable savings in fuel and operating costs—elimination of coal and ash handling—and an improved product due to accurate control. For complete information write for Bulletin 101.

EASTON CAR & CONSTRUCTION COMPANY • EASTON, PA.

EASTON

EASTON-CLARMAC • *The* Electric Bitumen Heating System

PIT AND QUARRY

CHICAGO APRIL, 1941

Industries May Feel Impact of Priority Orders in Future

As the defense program gains in momentum there is increasing evidence that priorities will more and more become the order of the day. Acute shortages have already been noted in certain critical materials, resulting in priority orders restricting their use to front line defense needs with a consequent cutting off of supplies for civilian use.

It is, of course, not anticipated that any priority orders will be issued with regard to crushed stone, itself, but it is entirely conceivable that the availability of materials required in the manufacture of machinery, equipment and supplies needed in the production of crushed stone may be definitely and adversely affected by priorities limiting the use of such materials to defense needs, J. R. Boyd, administrative director of the National Crushed Stone Association points out.

There is reason to believe there has been too indiscriminate an issuance of priorities in the field and in many instances extending beyond the primary contractor. It seems inescapable that in the not distant future industries far removed from the front line of defense will feel the impact of such priority orders; and the difficulties which may potentially flow from such a situation stagger the imagination.

N.I.S.A. Convention at Hot Springs in June

The sixth annual convention of the National Industrial Sand Association will be held at the Homestead, Hot Springs, Virginia, on June 19 and 20. A considerable part of the program will be devoted to a discussion of the industry's position as affected by the defense program. There will be other important convention features, including a report on the recent negotiations in the Ottawa-Wedron fields between members of the industry on the one hand and representatives on the other hand of the Federation of Glass, Ceramics, and Silica Sand Workers of America, a C.I.O. affiliate. Stanton Walker, consulting engineer for the Association, will have a timely and interesting paper on *Reproducibility of Tests of Foundry Sands.*

Will Appeal Ready-Mix Case to Supreme Court

Assistant Attorney General Leo F. Tierney of Chicago has obtained an order from Federal Judge Charles E. Woodward to appeal the anti-trust suit against the late Michael Carrozzo and 11 other defendants, including two labor unions, to the United States Supreme Court.

A demurrer to the indictment, which charged a conspiracy to prevent the use and sale of ready-mixed concrete by strikes and threats of strikes, was sustained February 1 in the U. S. District Court at Chicago.

Coming Events

April 23-25, 1941—Hot Springs, Virginia. Convention, Concrete Reinforcing Steel Institute, Homestead Hotel.

May 27-29, 1941—Hot Springs, Virginia. Annual convention, National Lime Association, Homestead Hotel.

June 19-20, 1941—Hot Springs, Virginia. Sixth annual convention, National Industrial Sand Association.

June 23-27, 1941—Chicago. Annual meeting, American Society for Testing Materials, Palmer House.

Gravel Association to File Appeal in Grand Rapids Case

In a recent case involving the Grand Rapids Gravel Company of Grand Rapids, Michigan, the Commissioner of Internal Revenue ruled that owner-drivers of trucks used by that company were employees within the meaning of the taxing provisions of the Social Security Act. The company is actively engaged in sand-and-gravel and ready-mixed-concrete production.

Upon issuance of the decision, the company was required to pay Social Security taxes on the men retroactively to the effective date of the Social Security Act, with interest at 6 per cent. Prior to issuance of the decision, the Grand Rapids Gravel Company, with the assistance of the National Sand and Gravel Association, presented to the Bureau what would ordinarily be considered to be the most convincing evidence that the men in question occupied a contracting status with the company, since every element of a contracting relationship was shown to exist. The Bureau's ruling, however, was that the substance of an employment relationship existed and that the men must, therefore, be considered as employees.

The decision by the Bureau was a sharp reversal of a decision in an earlier case in which identically the same kind of owner-drivers were held to be contractors. It was the settled policy of the Bureau, prior to the Grand Rapids decision, that where owner-drivers were in fact contractors within the usual meaning of the relationship, there was no obligation to pay Social Security taxes. In fact, the Bureau's decision in the Grand Rapids case has never yet been fully explained, because it was said that it rested upon an unpublished and, therefore, unavailable ruling of the General Counsel of the Bureau.

The association has retained counsel to appeal the decision, since it is felt that it is a problem affecting the entire industry.

Paul F. Keatinge to Direct White-Cement Sales for Trinity

The Trinity Portland Cement Company announces that it is now engaged in the manufacture of white Portland cements, both plain and waterproofed. These products are being manufactured at the company's Houston plant and will be distributed throughout the entire country as well as to foreign markets.

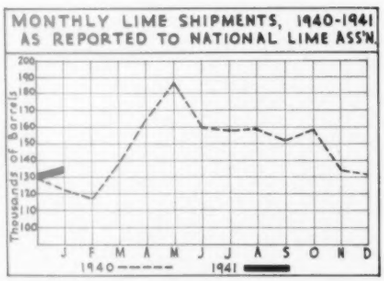
Sales of these cements will be under the immediate direction of Paul F. Keatinge, long identified with the white-cement business and well known to architects, contractors, and concrete products manufacturers. Mr. Keatinge has been closely identified with various trade associations and was formerly a vice-president of the Producers Council, Inc.

Seeks Acquisition of Gravel Land for Road

Condemnation proceedings against the Battle Creek Gravel Company, Battle Creek, Michigan have been started by the Michigan highway department to obtain a right-of-way across the company's property for a new highway from Fort Custer into Battle Creek.

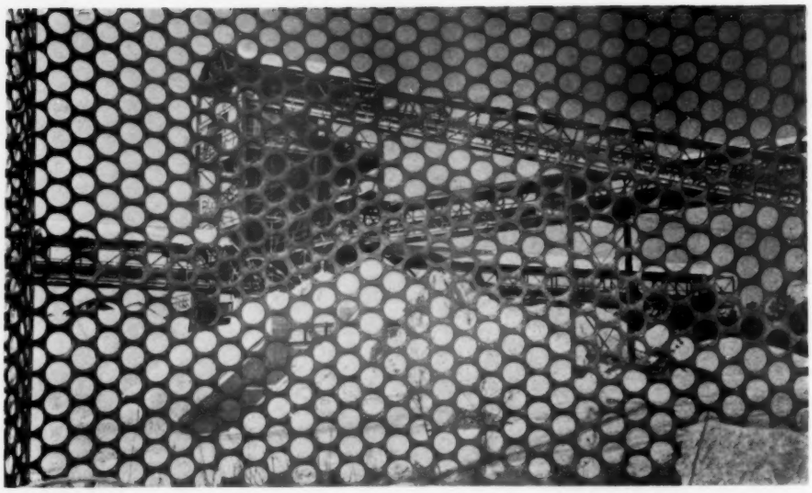
The highway department reported that the gravel company asked approximately $74,000 for a strip a quarter-mile in length and 86 feet wide which, it alleges, is exorbitant.

The gravel company contends it will lose 250,000 cubic yards of gravel, that the loss of the gravel will deprive it of maximum use of its $40,000 worth of equipment, and that it will lose a residence recently remodeled.



According to data collected by the National Lime Association, 71 companies in January, 1941, shipped 136,111 tons (94,229 quicklime; 41,882 hydrate). Reporting companies represent 51 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry the total shipments for the month are estimated to have been approximately 265,000 tons. Shipments of lime by use and grade for January, 1941, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	278	1,913
Building	16,289	21,326
Chemical	77,662	18,643
Total	94,229	41,882



Nelson Severinghaus, superintendent of the Lithonia plant of the Consolidated Quarries Corporation of Atlanta, sends in this unusual picture of a portion of the plant as seen through an old piece of perforated plate which forms a part of a fence on the property. The picture was taken by Mrs. Severinghaus, an ardent camera fan.

Production Resumed at Union Rock Wool Plant

Installing of machinery in the plant of the Union Rock Wool Company at Wabash, Indiana, is now complete and production is expected to be resumed shortly. The plant was destroyed by fire last September with a loss of around $75,000. A Fort Wayne firm had the contract for construction of the new fire-proof building. The plant is one of five in the county manufacturing mineral wool.

Opens 150-Ton Stone Plant in Northwest

A new crushed-stone plant has just gone into operation at Gold Bar, Washington under the name of the Consumers Lime Company, according to W. W. Gifford, president. Top capacity of the plant is 150 tons daily.

The new company was recently incorporated with a capital of $30,000.

Correction

In the caption of a drawing of a moisture-determination flask which was described at the recent ready-mixed concrete convention and reproduced in a report of that meeting in the February issue of PIT AND QUARRY credit for this description was erroneously given Irving Warner of the Warner Company, Philadelphia. As stated in the story of the convention, this description was given by J. J. Warner of the Richter Concrete Corporation, Cincinnati.

Cement Shipments Start Year with 105% Gain

The Portland-cement industry in January, 1941, produced 9,025,000 barrels, shipped 7,986,000 barrels from the mills, and had in stock at the end of the month 24,420,000 barrels of cement, according to the Bureau of Mines.

The production of Portland cement in January, 1941, showed an increase of 45.4 per cent. and shipments an increase of 105.1 per cent. as compared with January, 1940. Portland-cement stocks at mills were 5.2 per cent. lower than a year ago.

The factory value of the shipments from the mills in 1940—130,315,000 barrels—is estimated as $190,926,000, representing an average value of $1.47 per barrel. According to the reports of producers the shipments totals for 1940 include approximately 4,407,000 barrels of high-early-strength cement with an estimated mill value of $8,145,000.

Gypsum Maker's Earnings Up Despite High Taxes

The National Gypsum Company reported 1940 net income of $1,565,196, or $1.03 a share. In 1939 net income amounted to $1,455,237, or 94 cents a share.

Melvin H. Baker, president, said the gain in net income was realized despite a sharp increase in taxes and manufacturing costs. He reported that since the first of the year the upturn in business has increased substantially, with current sales running around 40 per cent. ahead of last year.

However, he said that further increases in manufacturing costs may necessitate an increase in prices. Main offices of the company are in Buffalo.

J. J. Riordan Dies; Was Superintendent at Santa Cruz Plant

Joseph J. Riordan, 52, superintendent of the Santa Cruz Portland Cement Company's plant at Davenport, California, since 1933, is dead following a long illness.

Mr. Riordan joined the company in 1907 when he went to work at the cement plant as a chemist. In 1929 he was promoted to assistant superintendent and seven years ago he took over the top job.

He was a past president of the Santa Cruz Rotary club and a past exalted ruler of the Elks lodge. He was a member of the Santa Cruz library board and chairman of the Santa Cruz municipal aquarium board.

Surviving are the widow, a daughter and five brothers.

Remove Newaygo Kilns for Use Elsewhere

Three rotary kilns 10 feet in diameter and 160 feet long have been removed from the plant of the Medusa Portland Cement Company at Newaygo, Michigan, for use elsewhere.

The Newaygo plant has not operated for several years and will probably be dismantled entirely.

Two of the kilns have been shipped to the company's plants at York, Pennsylvania, the other going to Alkali, Ohio.

Marblehead Lime Plant Purchased by Ash Grove

The Ash Grove Lime & Portland Cement Company has purchased the plant and quarry of the Marblehead Lime Company located at Springfield, Missouri, for a reported $75,000.

No personnel changes are contemplated, it is said.

Sharp Rise in Demand for Building Material

Aided by sharply higher demand from both construction and industrial customers, production and sales of the leading building-material companies are the largest on record for this time of year. Sales gains over 1940 are extremely sharp and in some instances are as much as 100 per cent. ahead of last year.

Earnings before federal taxes also are considerably ahead of last year, although the rate of gain is being curtailed somewhat by higher operating costs. While net profits during the current quarter should compare favorably with corresponding period last year, it will not be possible accurately to gage the trend until Congress disposes of the tax question, the *Wall Street Journal* reports.

Resigns Highway Job; to Head Gravel Firm

Former Highway Commissioner Burr H. Simpson has succeeded Arthur M. Hill as president of the West Virginia Sand & Gravel Company and the Standard Brick & Supply Company, affiliated corporations, of Charleston.

Mr. Simpson's resignation as road commissioner was submitted to Governor M. M. Neely Feb. 15, it was said, with the expectation of assuming his new duties as soon as a successor had been named. Mr. Hill, who has headed the companies since 1938, was said to have resigned because of "other interests."

National Gypsum Buys Mineral-Wool Concern

The National Gypsum Company of Buffalo has announced its entry into the mineral-wool field with the acquisition of the General Insulating & Manufacturing Company of Alexandria, Indiana.

With assets of approximately $1,000,000, the company has three plants—in Alexandria, Dubuque, Iowa and Gover, New Jersey. In business for 30 years, the company was a pioneer in the rock-wool field and had sales of approximately $1,200,000 in 1940. The National Gypsum Company previously has sold rock-wool insulation produced by other manufacturers.

New Laboratory Will Devote Attention to Limestone Research

A new and modern limestone research laboratory is being established at Quincy, Illinois, by the Calcium Carbonate Company.

The Calcium Carbonate Company was organized about 1930 by a group of limestone companies, and a laboratory was established at Quincy in 1934. Sales offices of the company are located in Chicago.

Because of the high calcium content of the limestone found in the quarries of the member companies, the pulverized stone is particularly suited for use in tooth-paste and powders, putties and paints, manufacture of rubber, pottery and tiles, mineral mixtures, calcimine and other products.

B. D. Reynolds of Joplin, Missouri, is president of the company; T. P. Black of Quincy, vice president; H. E. Schellberg of Weeping Water, Nebraska, treasurer; and L. E. Koken of Carthage, Missouri, secretary. Quarries and plants of the member companies are located at Quincy; Webb City, Missouri; Hannibal, Missouri; Carthage; Omaha; Weeping Water; and Ste. Genevieve, Missouri.

The Port Huron, Michigan, plant of the Peerless Cement Company is being reconditioned and will resume manufacturing cement as soon as installation of a coal pulverizer has been completed.

The plant had been idle since 1938.

The State Sand & Gravel Company of Indianapolis recently installed this new Caterpillar D7 tractor and Model L LeTourneau Carryall scraper, rated at 9.5 heaped cubic yards, to remove the overburden at its pit outside of Indianapolis. The area shown being worked in this photograph is approximately 200 by 400 feet. Round-trip hauling distances vary from 500 to 600 feet.

Begins Erection of New Cement Plant at Northampton, Pa.

The Universal Atlas Cement Company, as a part of its modernization and rehabilitation program begun about four years ago, has started work on the construction of a new, modern cement plant at Northampton, in the Lehigh Valley district of eastern Pennsylvania. This modernization program has been accelerated by the cement demand for national defense construction such as airports, cantonments, naval bases, defense housing, access roads, military highways, and plant construction in defense industries. Standard gray, high-early strength, and white Portland cements will be manufactured.

Mineral-Wool Group Elects Kuykendall

Mineral-wool sales for the third quarter of 1940 registered a 35-per cent. gain in dollar volume over the same period of 1939, according to figures announced by Wharton Clay, secretary of National Mineral Wool Association, at the association's recent annual convention held in Cleveland. For the first three quarters of 1940 the gain over 1939 was 32 per cent., a considerable part of the increase being due to wide use of mineral wool in government-sponsored housing projects and structures erected in connection with national defense preparations.

Officers of the association, elected for the coming year are: President—M. L. Kuykendall of Insulation Industries, Inc., Detroit; Vice-president—E. R. Stevens, Baldwin Hill Company, Trenton, New Jersey; Treasurer—E. I. Williams, Riverton Lime & Stone Company, Riverton, Virginia. The new board of directors consists of J. R. Addington, American Rock Wool Company, Chicago; L. M. Cassidy, Johns-Manville Company, New York; E. E. Wood, Jr., Therminsul Company, Kalamazoo, Michigan; Alan Hughes, U. S. Gypsum Company, Chicago; and G. E. Lortz, The Carey Company, Lockland, Ohio.

Wind Wreaks Havoc at Neal Gravel Plant

High winds caused heavy damage at the Cayuga, Indiana, plant of the Neal Gravel Company recently. The plant was in the process of being rebuilt when the miniature tornado struck.

The dissolution is reported of the Doblasue Lime & Milling Company, Republic, Washington.

SAND-PRODUCING FACILITIES AMPLE

Pursuant to a request from the National Defense Advisory Commission for information on the 1940 production and capacity of the industrial-sand industry, the National Industrial Sand Association made a survey to develop the desired data. A questionnaire was sent to every producer of record. Replies were received from companies whose capacity represents at least 80 per cent. of the total of the industry.

For the reporting companies the total production in 1940 was 7,385,603 tons, and the estimate of easy annual capacity was 16,221,156 tons. It is the belief of the advisory committee of the association that the "easy" capacity could be further readily increased by longer hours of operation and without a material increase of facilities or workers.

The significant point of the survey is that production of industrial sand in 1940, which was one of the heaviest tonnage years in the history of the Industry, was only about 45 per cent. of the easy capacity of the industry. Present facilities are thus believed to be ample and production tonnages can be stepped up to meet any demand that might grow out of the defense program.

Plans New Plant in Owen Sound, Ontario

The Chalmers Lime Products, Ltd., O. W. Shonfelt, manager, Owen Sound, Ontario, will erect a new plant to cost about $40,000 with equipment, according to reports.

$45,000,000 Spent for Cantonment Materials

The war department reports that it has spent more than $45,000,000 on building materials and equipment used in the construction of camps and cantonments.

The department said that delays which have hampered its camp and arms plant construction program were fast being overcome. As of February 21. it said, this was the status of 239 projects: 18 complete, 129 on schedule, 55 behind schedule, 24 ahead of schedule, and 13 not started.

Shortage of Cement Reported in Chile

Cement has become so scarce in Chile that government circles say work on many Chilean public works, dwellings, and other buildings must be abandoned if stocks are not increased soon.

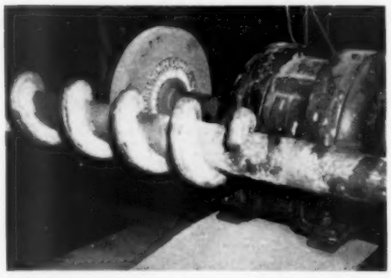
Cement has been ordered abroad and a rationing system imposed, according to a Santiago press dispatch.

Installing Equipment at Palmetto Quarries

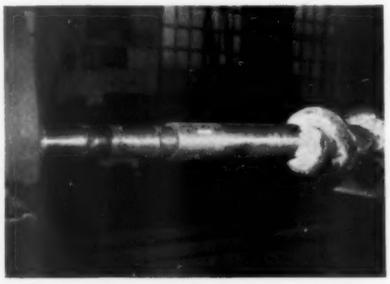
The Palmetto Quarries, Columbia, South Carolina, is installing new crushers, conveyors, electrical equipment, etc., at its quarry near Columbia.

R. A. Wilks of Cottonwood, Idaho, will shortly engage in the sand-and-gravel business on the Salmon River.

Reclaimed by Welding



Screw of a Fuller-Kinyon cement pump which has been built up by welding at the plant of the Medusa Portland Cement Company at Baybridge, Ohio. The worn shaft is built up with Aerisweld electrodes.



The screw after the shaft has been ground to close tolerance. The weld metal is a dense, high-strength deposit with the characteristics of true phosphor bronze.

Two-way valves for a cement line. At left a worn valve, at right one which has been reclaimed by the use of Abrasoweld electrodes after abrasion had worn it down. The weld deposit is said to harden rapidly under abrasion and impact. (Courtesy Lincoln Electric Company)

Small Residential Building Nearing Record 1928 Level

The volume of small residential building during February in the 37 eastern states came nearer 1928 levels than the volume of any February since that year. More than 18,000 new dwelling units were provided during the month by activity in the building of one- and two-family houses, which accounted for 34 per cent. of the $270,373,000 total contract volume in February.

The dollar valuation of contracts awarded for small-house construction, amounting to $90,782,000, represented an increase of 59 per cent. from the volume of $57,118,000 recorded for February, 1940. More than 80 per cent. of this February's total was provided through private-ownership building.

Even though the demand placed upon building materials by defense construction needs caused some advances in lumber prices last autumn, material prices have been generally steady since the opening of this year. Less local difficulties in material deliveries are being experienced since the peak of buying for cantonments has passed.

To Spend $350,000 on Bellefonte Lime Plant

An expansion program involving additions and improvements to cost approximately $350,000 will be made by the National Gypsum Company, new owner of the former Chemical Lime Company plant at Bellefonte, Pennsylvania.

Production at the plant will be doubled when the improvements are completed. One of the improvements will be the installation of another rotary kiln even larger than the present kiln.

Other improvements will include the expansion of the mine to triple the present output, and the installation of screeening and crushing equipment.

The firm will also remodel the present hydrating facilities, construct a new hydrating plant and revise and enlarge the loading facilities, the construction of a pulverizing department and the erection of a new office building.

Hiner Succeeds Young as P.C.A. Engineer

The appointment of C. W. Hiner as acting district engineer in Nebraska for the Portland Cement Association has been announced by Wm. M. Kinney, general manager. From headquarters in Lincoln, he will have three field engineers working with him to assist concrete users throughout Nebraska with design and construction problems.

Mr. Hiner's appointment, following the resignation of H. J. Young, climaxes 13 years of service as a field engineer with the association in Lincoln. Previously he was engaged in private engineering work in the public improvements field in Nebraska.

Dow Chemical Enlarges Texas Magnesium Plant

The Dow Chemical Company reports that work will start immediately on an $8,000,000 addition to its magnesium plant at Freeport, Texas.

The new construction will be financed by the Defense Plant Corporation, a division of the Federal Reconstrucion Finance Corporation, and the new unit will be government owned, it is said.

Concrete Pouring Well Advanced at Friant Dam

Concrete pouring at Friant Dam of the Central Valley Project in California is now proceeding at the approximate rate of 5,500 cubic yards daily. The highest concrete in the river section is 84 feet above bedrock. When completed, Friant Dam will be 320 feet high.

More than 500,000 cubic yards has been poured to date. The dam ultimately will contain 2,200,000 cubic yards, making it the fourth largest concrete structure in the world.

Carrara Transports Kiln Over Highways to Plant

A rotary kiln was recently transported by motor truck and special trailer a distance of 700 miles from Eureka, Utah, to Beatty, California, where it has been installed in the new plant of the Carrara Cement Company. The kiln was formerly used to process ores at the Eureka mill of the Chief Consolidated Mining Company.

The truck-trailer outfit rolled on a total of 26 pneumatic-tired wheels and a special permit for its use was required from the Utah and California highway departments.

Insulation Firm Buys Up Adjoining Tract

The Reardon Insulation Company, Cincinnati, mineral-wool firm, on March 6 acquired a tract of land immediately to the north and adjoining their present holdings.

The new piece is 125 by 25 feet and will be used for expansion.

Prepare $23,000,000 Project Involving Defense Highways

According to Federal Works Administrator John M. Carmody preliminary estimates indicate that the Army, Navy, and defense industries are in vital need of approximately 4,000 miles of roads and streets within and approaching reservations and industrial sites, and that this construction will cost about $23,000,000.

These reservation and access roads are priority No. 1 in the defense-road program. They have been certified as essential to national defense by the War and Navy Departments and by the Advisory Commission to the Council of National Defense.

This total of about 4,000 miles of reservation and access roads isn't the end, however. Almost daily one or another of these authorized defense agencies is certifying still another Army camp, still another Naval establishment, or still another defense-industry site. Up to the present, about 175 camps and industrial sites have been certified for defense roads.

Some of these urgently needed roads are being built, particularly within the reservations. The War Department has some funds for the construction of these reservation roads. But the roads outside the reservations and industrial sites—the access roads—are being delayed. These access roads represent more than half of the total mileage and about three-fourths of the total cost of the urgent defense roads.

The reason for the delay in building access roads is complicated, but here is one phase of it: Funds are not available to do the work outright. By law, present Federal appropriations can be spent on the construction of access roads only if state or local money is available to pay part of the costs. This is true to a certain extent with reference to operations of the W.P.A. as well as the work carried out with Federal-aid funds. The states are reluctant to provide their share. In general, they are asking if the approach roads from the main highways to the various camps are not just as much a Federal responsibility as the camps themselves.

Some states simply do not have the money required for the construction of all necessary access roads in a single year.

Fire caused loss estimated at $3,000 when it destroyed the blacksmith shop at the quarry of the Quartzite Stone Company at Lincoln, Kansas, a few weeks ago.

CURRENT BUSINESS INDICATORS

Recent weeks have been marked by two developments that are certain to have an important influence upon the course that will be followed by business in the critical months that lie ahead.

First, and probably most significant, has been the establishment of an eleven-man National Defense Mediation Board, headed by Clarence A. Dykstra, president of the University of Wisconsin and director of the Selective Service. This agency is patterned after the Old War Labor Board, having authority to handle labor disputes that threaten "to burden or obstruct the production or transportation of equipment or materials essential to the national defense." This step is interpreted as meaning that an epidemic of labor controversies, such as characterized the short-lived business revival of 1937, will not be tolerated in the present emergency.

Hardly less significant from the standpoint of business has been the formalization of an expanded priorities system. Under the new arrangement officers of the Army and Navy Munitions Board may automatically assign priority ratings to thousands of products falling under the "Critical Priorities List". The net effect of the new regulations is that defense demands will have first call on materials that are vital to the defense effort. Virtually all branches of industry are certain to feel the pinch of priority regulations in the near future.

Meanwhile, most of the more important indicators of industrial activity advanced to new high levels. Measured by the Federal Reserve Board's index, industrial production rose from 139 per cent. of the 1935-39 average in January to 141 in February. This marks the fifth consecutive month that a new high record has been established by the composite index of industrial output.

As in the months immediately preceding, the major share of the February upturn was accounted for by the durable-goods industries, which at present are contributing most heavily to the defense program. Increases were particularly impressive in the machinery, aircraft, shipbuilding, and railroad-equipment industries. Steel production, on the other hand, fluctuated within a comparatively narrow range during February, with the rate of operation for the month as a whole being maintained at approximately the same level as in January.

Production in the non-durable goods industries continued for the most part at the record-breaking levels that were attained in the closing weeks of 1940. Increases, however, were reported in the textile, rubber, and chemical industries. These gains virtually offset the minor declines that took place in January.

The rise in industrial production is reflected in employment. Measured by the Bureau of Labor Statistics index, non-agricultural employment in January stood at the highest level on record for this season of the year. In many branches of manufacturing employment continued to expand and largely counterbalanced the seasonal declines that occurred in the retail trade. All evidence suggests that employment continued at high levels during February and the first half of March.

Prices of most basic raw material have moved to distinctly higher levels in recent weeks. For the week ending March 8 the Bureau of Labor Statistics Wholesale Price Index of 28 basic commodities advanced to 125.7 per cent. of the August, 1939, level, a new high since September, 1939. Particularly significant advances have taken place in the prices of nonferrous metal scrap, but the rise has recently spread to a number of other items.

The advances in wholesale prices during February and the first half of March are regarded as forerunners of a more or less general upturn that is likely to take place during the next few months. To some extent they indicate that in a number of industries production is now pressing hard against the outside limits of capacity and in some lines genuine shortages are beginning to appear.

Asphalt Use Beats 1939 Record by 6%

Asphalt consumption set a new record of 6,580,400 tons last year in the United States, rising 6 per cent. above the previous peak in 1939, it was announced at the annual directors' meeting of the Asphalt Institute, held March 12 at New York.

The increase was attributed in part to the use of asphalt for new military and naval air stations, new civil airports and construction of defense roads.

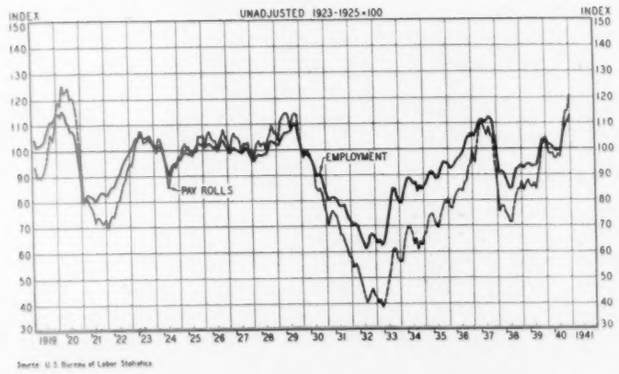
The board elected Herbert Spencer, technical adviser in the asphalt sales department of the Standard Oil Company of New Jersey, to the newly created post of full-time president. W. R. Macatee was elected managing director.

Potash Industry Can Meet Country's Requirements

The American potash industry, developed as the result of an acute shortage during the World War, has been described by the Bureau of Mines as now capable of meeting all requirements of this country.

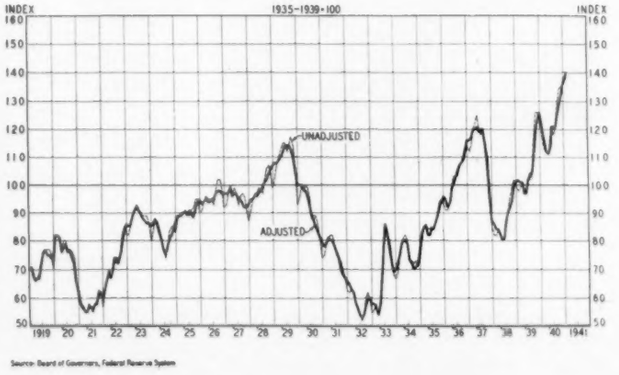
The United States last year produced 658,249 short tons of processed or refined potash salts, representing a gain of 20 per cent. over 1939. The bureau said this country could expect no importations of this material in 1941. In years past France, Germany, Belgium and the Netherlands have shipped potash to this country.

FACTORY EMPLOYMENT AND PAY ROLLS



Source: U.S. Bureau of Labor Statistics

INDUSTRIAL PRODUCTION



Source: Board of Governors, Federal Reserve System

EDITORIAL

Defense for War—III

THE contempt of the Axis Powers for the principles of democracy is not as well or as widely understood by Americans as it should be. We are still, in our thinking about international affairs, an isolated people, despite the availability of source-material that is essential to a knowledge of foreign beliefs and attitudes.

Europeans and their problems are still, to most of us, persons and situations outside our sphere of interest—a field with which we should have neither intellectual nor political "entanglements." It is one of the ironies of our position in the world that a nation, composed of the products of the vastly different political and cultural backgrounds found on the other continents, and preaching—if not always practicing—the principles of the equal rights of human beings, should continue to consider itself as a group apart from the problems that affect people in the other hemisphere. There is still too common a belief that, while the goods of commerce move freely between countries in a flow, whose volume steadily increases except in times of war, ideas, in some strange manner, are stopped by political boundaries and that the advances made by one people in the field of politics are not equally free to move from one land to another. Because of this traditional mental isolation we find it difficult to believe that Europeans are more interested in us than we are in them, and that they could possibly have aggressive intentions toward us, who, because of our great strength in natural resources, have had no such ambitions affecting them.

The attitude of the German, Italian and Japanese governments toward our form of government and the principles which we believe underlie it has been expressed in terms that should leave no one in doubt as to their real opinions of political equality, racial and religious tolerance, individual freedom and the other tenets of our political system. Those opinions have appeared in all languages and in all countries through the world-wide distribution of their propaganda agencies, yet at a time when the forming of intelligent opinions is essential to national safety most of our people are unable to recall, even if they have seen them, these expressions of contempt for what we like to think of as the "American way of life." Of parliamentary lawmakers Hitler said in his *Mein Kampf* that questions of policy in a democracy "will always be decided by a majority of ignoramuses and incompetents" . . . "narrow-minded, vainglorious, and arrogant amateurs, an intellectual *demi-monde* of the worst kind." "The snivelling democracies," said Mussolini in designating the United States, Britain, and the other remaining examples of government based on the recognition of the rights of the individual. The American government has been called "the last disgusting death-rattle of a corrupt and outworn system."

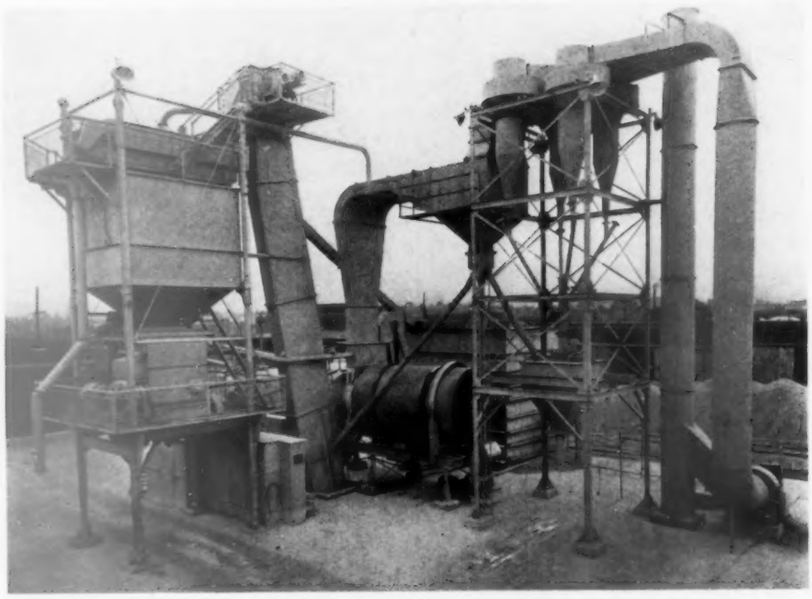
For these biting criticisms there is, unfortunately, some factual basis. The inability of democracies to act swiftly and decisively in a crisis is one of the dangers to, as well as one of the safeguards of, the rights of men. The spectacle of a Congress devoting practically two months to consideration of the "lend-lease" bill—a measure vital to the security of the United States—was one certain to produce ridicule abroad as well as caustic comment here. In a little more than half that time the forces of German aggression had conquered France, yet day followed day, and week followed week while men entrusted with the safety of democratic institutions in this country indulged in vapid moralizings and appeals to national cowardice that would be shunned by debaters of high-school age. There was no sound objection to the bill that could not have been raised in the first few hours of the discussion bearing on the desirability of enacting it into law, no fact of importance that was discovered or revealed after the end of the first week. It is painful to democratic pride to be obliged to record the fact that men who had little or no understanding of the grave conditions surrounding this nation's future, or of the forces that work against our democracy both within and without, could talk for hours and hours and say so little that was fraught with meaning or wise advice.

In preparing for any war that may come upon us it is as important to arm ourselves in the field of the intellect as in that of military combat. This democracy in which we so loudly profess to believe, and for which this war, like World War I, is being fought, must be held closely to the principles on which it is founded. It is not logical to assert our belief in high moral standards in the relationships between peoples unless we are prepared to give those principles meaning in practice.

IN refusing to believe in the alleged racial superiority of the Germans we must not overlook the dangers of dealing in patronizing ways with racial minorities among us. In condemning the lack of tolerance shown by the dictator powers in dealing with political opponents within their borders, we must not become intolerant of dissenting opinions among our own people. In deploring the subjugation of weaker nations we must not fail to guard ourselves against the temptations of oppressing, by diplomatic, economic or military means, nations that are weaker than our own. We must not upbraid other nations if they do not treat their subjects fairly and equally, unless we can show a disposition to recognize here the rights of those who are customarily the victims of economic, social and political discrimination. We must not exhibit great moral indignation at the practices of the governments opposing the democracies, while we talk glibly of scrapping the social and economic gains which have been made by Americans in recent years. We must be sincere with ourselves, we must be genuine in the voicing of our principles; to earn respect for our oft-asserted belief in democracy among those who sneer at us we must show that our performances accord with our professions.

There is much more to defense for war than the building of a physical "arsenal for democracy." Many of us must shed not only the physical conveniences of a high standard of living but also the intellectual complacency that has taken the place of right thinking. We have as much to do in mental preparedness as in physical preparedness.

Old St. Louis Pavements Salvaged at Low Cost With Asphalt Supplied by All-Electric Plant

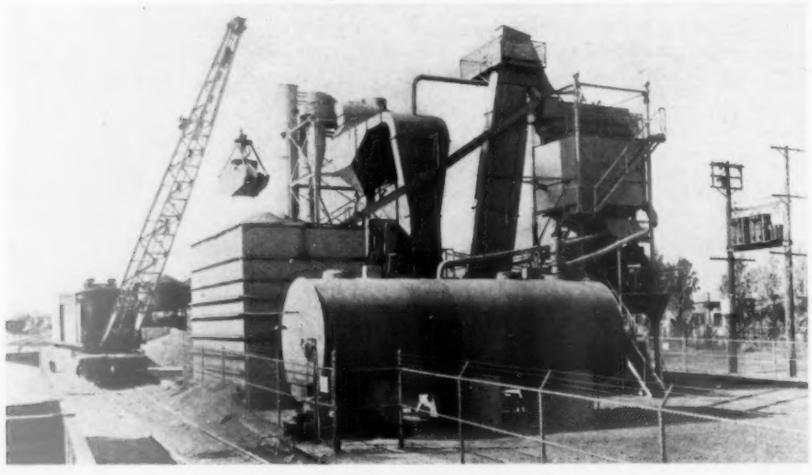


A view of the aggregate-bituminizing plant which illustrates the inclosure of all machinery and the dust-collecting equipment which keeps this plant dustless.

By W. E. TRAUFFER

THE new all-electric hot-mix asphalt plant operated by the city of St. Louis is unquestionably one of the most efficient and economical operations of its kind in existence. As such it might be called a symbol of the city administration which built it. Under Mayor Bernard F. Dickman, a Democrat, who came into office in 1933, the city has had eight years of a city government which has saved the taxpayers millions of dollars without skimping on necessary public improvements. In his campaign Mayor Dickman promised that no streets would be laid with tax bills unless 51 per cent. of the people affected petitioned for it, and he has made good his promise.

As in most other large cities, the Department of Streets and Sewers was in a deplorable condition and it was decided that a firm and experienced hand was needed to put this department on a businesslike basis. Frank J. McDevitt was named Director of Streets and Sewers and under his direction this department has been largely responsible for the high standing which St. Louis has achieved among city administrations. Mr. McDevitt is a graduate mechanical engineer from Lehigh University and has also had much civil-engineering experience. Since 1911 he had been active as a consulting engineer in St. Louis, specializing in the design and construction of industrial electric power-plants.



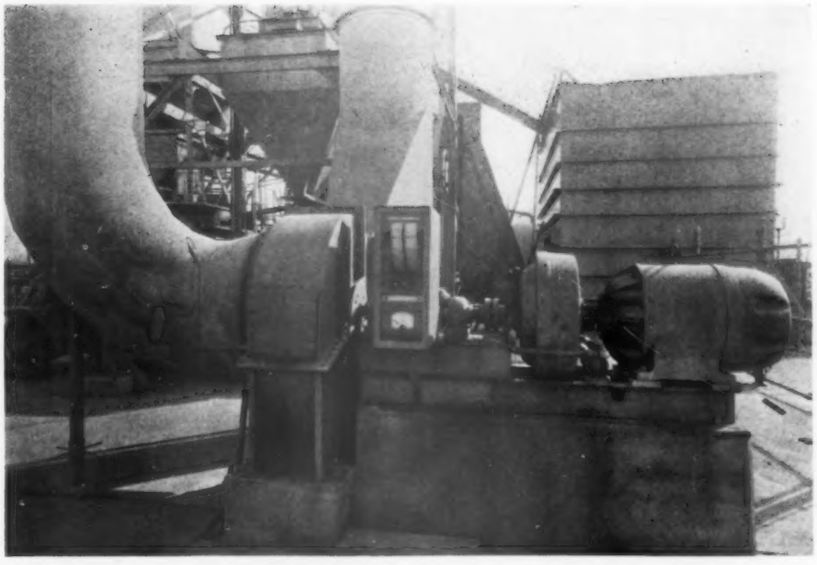
In the foreground is the electrically-heated bitumen tank with the pump above and the pipes leading to and from the plant. At the left the crane is loading aggregates into the bin.

Away back in 1923 the city had floated a public-works bond issue of $83,000,000 and in the next 10 years embarked on a street-improvement program. Over $30,000,000 was spent on the reconstruction of old paved streets. Of this amount $5,000,000 came from this bond issue and the remainder came from special property taxes. These taxes made it necessary for many citizens to mortgage their homes and later during the depression hundreds lost their homes through foreclosures.

In improving a street everything had been torn up, including the base, car tracks, etc, and an entirely new pavement laid. This practice was one of the first to be stopped by Mr. McDevitt, who estimates that it alone had wasted millions of dollars. Under his guidance over 40 miles of abandoned street-car tracks have been covered up and the street-car company has paid half of the cost. During the past eight years, according to Mr. McDevitt, the city has salvaged about 5,000,000 square yards of old street bases. Based on an average street width of 36 feet from curb to curb, this amounts to 250 miles of streets. This resurfacing work was done with city forces out of the regular budget funds and no tax bills.

According to Mr. McDevitt this resurfacing has been done at a cost of 50 cents per square yard, including labor, materials and direct supervision. A large amount of patching is also included in this figure, but it does not include overhead, administration or the depreciation of equipment. The cost of labor alone has averaged 12½ cents per square yard.

Another key to Mr. McDevitt's success in giving St. Louis uniformly-good pavements at low cost is the fact that only one type of binder and one type of surface material is made. Special mixtures have been developed for these products which have stood up exceptionally well under severe traffic and



The dust-collector fan and its weather-proof electric motor and variable-speed fluid coupling. Meters which automatically control the fan operation are also shown.

weather conditions. In a trip about the city the writer saw side streets and heavily-travelled main streets which were resurfaced three or four years ago and are still in very good condition. These surfaces showed little of the ravelling or chuck-holes commonly found in such pavements after a hard winter and very little evidence of patching.

The mixture used also produces a definite anti-skid, non-glare surface, which has been instrumental in reducing traffic accidents. This material results in a gray, abrasive surface which does not become slick in wet weather or reflect the headlights of oncoming cars as does the ordinary sheet-asphalt pavement. Two years ago the American Automobile Association conducted a test using an automobile with average tires driven at the rate of 30 miles per hour. On wet sheet asphalt this car was stopped in a distance of 134 feet. On this wet anti-skid surface it was stopped in 57 feet.

Until the new electrically-heated asphalt plant went into operation on April 1, 1940 all the paving material was supplied by an old steam plant now 30 years old. The water-tube boilers in this plant supplied steam from an engine which operated all the equipment and the exhaust steam was used for heating the bitumen. Fuel-oil was used to fire the drier. This plant was dismantled when the new electric plant was erected on the same site. It is located at Kingshighway and De Tonty Street near the geographical center of the city in a semi-residential neighborhood.

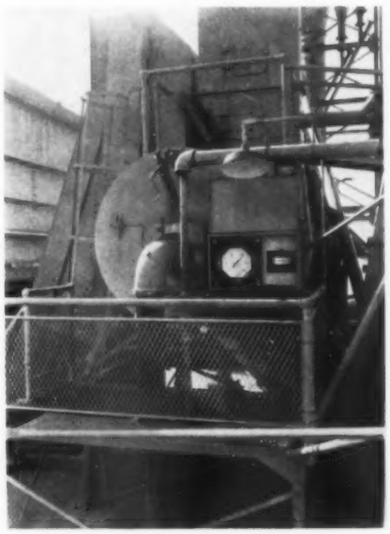
For about three years before the new plant was built Mr. McDevitt had given the subject much study and had visited many plants in other cities. He found that most of these plants turned out a good product one day and a poor one the next, and decided to build an electric plant which would turn out a uniformly good product every day. The result is evident from the following figures. The new plant has effected a saving of $16,000 per year on labor and $6,000 on maintenance cost. Its 100-ton per hour capacity is double the output of the old plant but $3,000 has been saved on fuel cost alone. As this plant is operated day and night it also saved $6,000 annually on the rental of a privately-owned steam plant which was operated at night to supplement the old plant since that could only be operated in the daytime. The total identifiable saving for which the new plant is responsible is $31,000 for its first year of operation. It is estimated that the $75,000 first cost of this complete plant will be paid for out of the savings in two more years.

Three industrial concerns, each working independently on its own phase of the job, coöperated with each other and with Mr. McDevitt, to design and equip this new plant, in which has been incorporated many of his personal ideas. The Simplicity System Company is responsible for the general plant design and equipment, including the drier, screens, storage bins, scales, mixer and related equipment. The Easton Car & Construction Company designed and furnished the complete asphalt storage, heating, and handling system and the American Blower Company adapted its dust-collection system to the requirements of the plant.

The crushed stone used in the anti-skid wearing surface is a hard and tough dolomitic chat. This material is a waste product of lead mines 40 miles south of St. Louis and costs $1.03 per ton delivered at the plant. All this stone passes a ½-inch opening, 3 to 5 per cent. is retained on a ⅜-inch screen, and nearly all is retained on a No. 80 sieve. The crushed limestone used in the binder is obtained from the St. Louis Work-house quarry. This is a well-graded product with a maximum size of 1½ inches and a minimum of 80-mesh.

An Ohio locomotive crane is used to transfer these materials from the cars to stock-piles. The crane also feeds them from the stock-piles into the 600-ton, 4-compartment ground-level steel bin which is all that was retained of the old plant. A pan-feeder discharges the aggregates from any of or all these compartments to an inclosed bucket-elevator. This "cold" elevator feeds the stone into the Simplicity 2-pass rotary drier, which is fired with natural gas at 25-pound pressure by a Surface Combustion Company inspiration-type burner. The velocity of the gas passing through this burner induces the exact amount of air needed for combustion before ignition takes place. Emsco Nordstrom valves are used in the gas line.

The dried aggregate is discharged from the drier into an inclosed bucket-elevator from which it is dropped on a 1-deck, inclosed vibrating-screen on which two sizes of cloth are used. This



The firing end of the rotary drier with some of the meters which control its operation.

screen divides the material into the two sizes required for binder and top-surfacing, and these materials are discharged into separate compartments of the 50-ton steel plant bin. Bindicators are used on this bin to warn when it is full. A pipe carries away any oversize material from the screen. There is also an overflow pipe which can carry material from the hot elevator back into

the ground-storage bin in an emergency.

The asphalt-heating system has been arranged to take care of all the heating requirements in the plant. The 85-to-100-penetration asphalt is received at the plant in insulated railroad tank cars from a Standard Oil Company refinery 18 miles distant. The material is transferred to the storage tank by an electrically heated and controlled Kinney asphalt pump, through a 3-inch pipeline, which is also electrically heated. This is a new development of the Easton Car & Construction Company in connection with its complete electric asphalt-heating system.

Another view of the plant with the electric bitumen-heating tank and pipes in the foreground.

The electric asphalt-storage equipment consists of an 18,000-gallon tank, 10 feet in diameter and 30 feet long, carefully and thoroughly insulated to reduce operating costs and asphalt temperature variations as much as possible. The tank is heated by 15 Easton electric elements of various lengths, nine inserted through one head of the tank and the remainder through the other. To make possible the greatest flexibility and economy in operation, any desired number of elements can be turned on manually and thereafter a thermostatic-control system operates these elements, automatically and accurately maintaining the desired asphalt temperature regardless of the outside temperature or the speed or regularity with which the bitumen is withdrawn for use. This even temperature is one of the main reasons why such good results are being obtained with the mixtures made.

The asphalt is fed from the tank to the A. C. weigh-bucket over the mixer through a modified Easton-Clarmac electric ring-main piping system. An important feature of this system is a pump, which is suspended and submerged in the body of the hot asphalt in the tank and is driven through an extended shaft by a 5-horsepower vertical, reversible motor, mounted on a manhole cover on the top of the tank. This makes possible the easy removal of the entire pump-and-motor assembly from the tank for cleaning, inspection or repair. Asphalt is pumped through an insulated 3-inch circulating pipe-line from the pump to a high point above the mixer platform and then back to the tank again. A branch section of piping from the circulating line is used to supply the asphalt to the weigh-bucket. To insure the full flow of asphalt into this branch line a pressure-relief valve has been inserted in the circulating line about a foot beyond the point where these two lines join. This valve is normally set in the closed position, but is forced open by the pressure of the asphalt being pumped through the circulating line when asphalt is not being discharged into the weigh-bucket. When drawing off asphalt, the valve in the branch line is opened, thus reducing the pressure against the relief valve so that it remains closed and forces the asphalt to flow to the weigh-bucket. The pressure-relief valve in the circulating line is of a type that can also be operated manually, so that at the end of a day's run the line can be drained of asphalt by manually opening the relief valve and simultaneously reversing the rotation of the pump, thereby sucking back the asphalt in the line and returning it to the tank.

On starting up the following morning there is no delay due to the necessity of "thawing out" the cold line of asphalt, as the piping system is always clear and ready for immediate use.

Under all normal operating conditions the design of the piping system eliminates the necessity of applying heat to the line to prevent the bitumen from congealing. This results in an appreciable economy, due to the reduction of the power demand and energy consumption. However, as a protection against unforeseen contingencies, electric-heating elements have been continuously applied to the external surface of the pipe in the standard Easton manner. The pipe and the element is then incased in an efficient pipe covering, thereby creating an electric oven around the pipe. A thermostatic-control system operates these elements, preventing their use except when required.

Controls for the Easton-Clarmac electric-heating system are located in a central switchboard cabinet located at ground-level. In addition to the thermostatic and automatic controls previously mentioned instruments used for test purposes and to obtain permanent records of operation are also mounted on this panel. These include a recording meter for the asphalt temperature, a demand meter and a kilowatt-hour totalizing meter.

Power is purchased by the city at 9 mills per kilowatt-hour from the Union Electric Company under a single contract covering all municipal usage, including street lighting, etc.

Asphalt is measured in an Easton-Clarmac electrically-heated weigh-bucket, and is discharged into the mixer by an air-operated rotary discharge valve through coinciding perforations at the bottom of the bucket. The aggregates are discharged through air-operated gates into a 5,000-pound-capacity aggregate-weighing batcher. The asphalt and aggregates are discharged into the Simplicity horizontal dual-shaft blade-type mixer, which has renewable liners, the completed mixture passing through air-operated gates which insure complete and rapid discharge. The entire process of feeding, weighing and mixing is done automati-

One of the ground-level central switchboard cabinets in which are most of the control and recording instruments and equipment which contribute to the efficiency of this plant.

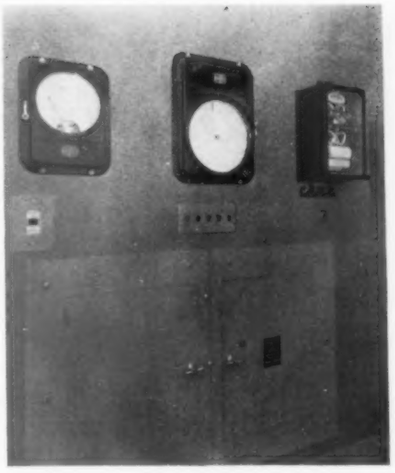
cally in sequence. Push-buttons are used to start each sequence and can stop it in an emergency.

The old plant emitted large volumes of smoke and dust which created a neighborhood nuisance and made it necessary for plant workers to wear respirators and goggles. The new plant is absolutely dustless as all the equipment is fully inclosed. Even the asphalt bucket, the aggregate-weighing batcher and the mixer are inclosed in a steel housing.

All the equipment is connected to an efficient dust-collecting system by pipes leading into the main duct from the drier. With this arrangement no dust can possibly escape as all the equipment is under a slight negative pressure. The dust first goes into a knock-down box of the department's own design which collects the largest and heaviest dust particles. Following this box is a 4-unit American Blower Company Sirocco dust-collector with a damper which can shut off any desired units and is operated from the ground by means of chains. This makes it possible to adjust the dust-collector efficiency approximately to the capacity at which it is being operated. Further control is made possible by the use of an American Blower Company variable-speed fluid coupling on the American fan, which furnishes the induced draft through the collector. A 440-volt, 3-phase, 60-cycle G.E. constant-speed, weather-proof motor drives the fan. Indicating meters show the fan speed, the drier exit-gas temperature and the draft at all times and the fluid coupling can readily be adjusted to maintain a uniform velocity through the collector at all times. The dust collected in the box and the collector goes into a dust bin from which it is removed periodically. The coarse dust from the box can, if desired, be chuted through another pipe into the "hot" elevator.

No guess-work is permitted in any phase of the operation of this plant. The Kron dial-scales on the asphalt bucket and the aggregate batcher automatically print the number of the batch and the weight on tickets which are kept as permanent records. In this way any batch can be checked at any time and the wide variations in mixes common in most plants are eliminated. An electric recording meter also gives a check on the number of batches produced daily.

Moisture determinations of the aggregates are made every morning before operations are begun. The prevailing dew-point is then calculated. Charts made up from past records and experience then make it possible to determine the amount of draft and heat necessary to extract the moisture from the stone without waste.



Another ground-level cabinet in which are recording meters and switches.

As an aid to the fireman the gas-burner on the drier is equipped with an indicating pressure-gage and a gas flow-meter and there is a pyrometer giving the temperature of the stone leaving the drier. These instruments and others for aggregate control are contained in three cabinets at ground level. Other instruments include recording meters for aggregate temperatures, power consumption for plant operation, draft gages, etc.

Mr. McDevitt does not believe that it is necessary to inclose an aggregate-bituminizing plant in an expensive building, because when the weather is so bad that men can not work outdoors, it is also too bad for streets to be paved. Cold weather alone does not interfere with operations but rain and snow do. Pavement has been laid in temperatures as low as 15 degrees F.

All the moving equipment is fully inclosed and G.E. weatherproof motors are used throughout. All possible safety precautions are taken. All the stairs and platforms have, in addition to the usual railings, wire screen between the railings so that no one can slip between them. Flood-lights make night operation safe and efficient.

When an old street is to be resurfaced it is thoroughly swept before applying the hot asphaltic mixture at a temperature of about 250 degrees F. This material is raked by hand and compacted by a 10-ton gasoline roller. Traffic can be allowed on the pavement immediately after compacting. Streets on which there is a heavy flow of traffic during the daytime are resurfaced at night so as to avoid interfering with traffic and business. Each resurfacing crew on night operation has two portable 1,500-watt generators, direct connected to a 4-cylinder gasoline engine, the exhaust of which passes through a Maxim Silencer. The operation of these units is noiseless. A 1,500-watt light attached to an extension pole provides the necessary illumination.

During the summer of 1938 the entire downtown business section was resurfaced at night. The old streets had been paved with wood blocks on a concrete base. It was necessary, therefore, to put in a 3-inch binder course and follow this with a 1-inch anti-skid surface. This work cost $1.00 per square yard, toward which the merchants in the business district paid 75 cents for the material and the city contributed 25 cents representing the labor cost. All this work was done by departmental forces.

The city operates its own fleet of dump trucks and other equipment required for this work. This includes twenty-two 5-ton dump trucks and four 10-ton road-rollers. Three resurfacing crews are usually kept busy during the day and two crews at night, in addition to the patching crews.

Arizona Nonmetallics Need Development

The Department of Mineral Resources of Arizona, created in 1939 completed its first full year June 30, 1940, and it recently published its first annual report.

According to the opening remarks of the publication, "the nonmetallic mineral resources in particular offer a most fertile field for new development, and a ready market has been created on the Pacific Coast for many of these." It is in this direction that the first efforts of the new department of Arizona apparently are being made. Although metallic enterprises also are to be encouraged, the feeling is that the nonmetallic resources of Arizona have been sadly neglected and that a lack of knowledge of these minerals and their markets has handicapped development, which the new department hopes to remedy.

Moreover, the national defense program, it points out, "offers great opportunities for the production of certain strategic or critical minerals that are essential to an armament program and with which this State is richly endowed." The department expects that it will be able to assist greatly in the national defense plans and thus share in serving the nation.

The annual further states that at least 21 mining operations have been begun either directly or indirectly as a result of contacts made by the department. The surveying of the various districts of the state devolves upon four field engineers.

Lawrence E. Craswell, head of the Portland Sand & Gravel Company, Portland, Oregon, died recently.

Long-Time Tests on the

THERMAL COEFFICIENT OF EXPANSION

of Portland Cement*

THE small amount of published research on the thermal coefficient of expansion of Portland cement and concrete contains many conflicting data. Regardless of the kind of mix, the type of Portland cement, or the storage conditions of the concrete, engineers generally use an approximate coefficient of thermal expansion usually .0000055 per degree Fahrenheit.

One reason for this unsatisfactory state of knowledge is the number of other volumetric movements in concrete that may occur simultaneously with thermal volume changes and vitiate the results; some of these changes of volume are:

Creep, or flow of concrete under sustained loads.

Elastic or instantaneous changes under load.

Expansion in more humid conditions and contraction in less humid conditions.

Autogenous shrinkage, or spontaneous contraction of gel structure.

Chemical reactions such as hydration, or sulphation of cement compounds and oxides.

Creep and elastic movements can be eliminated in controlled laboratory conditions. Autogenous shrinkage over the time of test is probably very small, but changes in volume due to loss of water from test pieces to air are relatively great and the specimens must be either in an atmosphere of controlled humidity or inclosed in air-tight containers which do not restrict the movements of the specimen.

Theory of Gel Structure and Cement Properties.—The thermal-expansion behavior seems to be generally consonant with a new view that high coefficients are associated with theoretically large quantities of cement gel containing a medium amount of water and low coefficients are associated with a theoretical low gel content, a desiccated, aged, or hardened gel and a water-saturated gel.

When Portland cement reacts with water some of the hydrated products are crystalline and some are colloidal. Tricalcium silicate hydrates to amorphous calcium silicates and splits off crystalline lime. Dicalcium silicate slowly hydrates to amorphous silicates and very little crystalline lime. Tricalcium-aluminate hydration products are practically all crystalline, while tetracalcium alumino ferrite forms crystalline hydratetd tricalcium aluminate and amorphous calcium ferrite.

From this it is seen that both crystalline and colloidal materials are present in hydrated Portland cement, but since the silicates which form the silicate gel predominate and the crystalline lime split off during the hydration of C_3S is not very effective as a cementing agent, it is now generally agreed that the properties of hydrated Portland cement are closely connected with its colloidal structure.

Many minerals are formed in nature as colloids, or amorphous materials, in the course of time they change to crystalline minerals. Only a limited number of compounds have the property of enduring as gels for a long time; the majority soon become crystalline, which is the stable condition of minerals in nature.

The transformation from gels to crystals is spontaneous but its rate can be accelerated by changes in its environment, such as changes in temperature, humidity, and by shock, pressure, and loss of water to water-abstracting salts.

Hydrous SiO_2 gel in changing to a crystalline state passes through the following stages: silica gel, opal and its varieties, cacholong, chalcedony, and finally quartz. Each step in this transition is accompanied by water loss, starting with a high-water-content gel and ending with anhydrous quartz.

Cement particles hydrated with a great excess of water show much crystal growth; but in water concentrations of mortar and concrete consistencies only amorphous products are easily discernible. Many years ago Kühl studied, under the microscope, fresh cement pats made of pastes ranging from 25 to 70 per cent. of water to the weight of cement, but could find no evidence of crystals; twenty years later the same specimens were re-examined and showed some crystallinity under the polarizing microscope and those pastes which had been mixed with the greatest percentages of water showed the most crystal development.

Test Results on High and Low Tricalcium Cements.—In Figure 1 the thermal coefficient rises rapidly in the high C_3S cement, reaches a maximum at about five months, and then drops off. In this cement rapid hydration has developed much gel in the early periods and the aging of this gel into a metacolloid, and possibly accompanied by the progress of crystallization of those substances approaching the amorphous state, has lowered the coefficient.

In the case of the low C_3S cement less gel is formed in the early stages and the coefficient reaches its maximum at a later period. Accordingly the aging of the gel starts later and the coefficient falls later, but somewhat above the coefficient of the higher C_3S cement, possibly because there is still a small amount of fresh gel being formed from the slow hydrating constituents which to a small degree offsets the effect of the aging of the gel previously formed.

The fall of the coefficient at later ages may not be due to gel aging alone; in spite of being sealed in air-tight containers, leaks in the envelopes did oc-

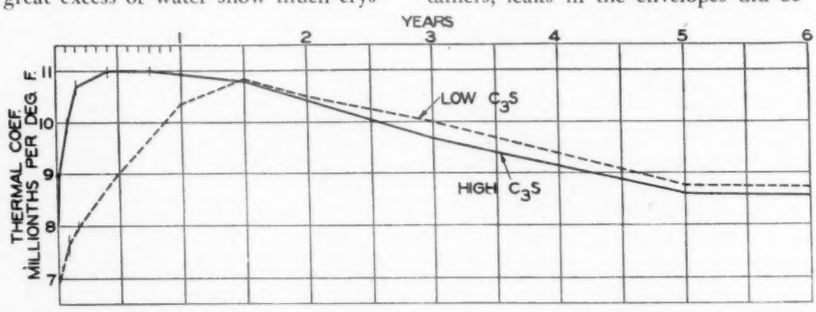


FIGURE 1. COMPARISON OF HIGH AND LOW TRICALCIUM SILICATE (C_3S) CEMENTS FOR THERMAL EXPANSION

Cements mixed neat at normal consistency and stored in inclosed air-sealed jackets; compound compositions as follows:

	Av. of 9 High-C_3S Cements, %	Av. of 4 Low-C_3S Cements, %
C_4AF	9.11	6.78
C_3A	8.59	4.10
C_2S	9.12	46.45
C_3S	66.82	35.60

* Condensed by the author from an article by S. L. Meyers, Southwestern Portland Cement Company, published in *Industrial and Engineering Chemistry*, August, 1940.

cur, resulting in some drying out which would also lower the coefficient if the drying approached a condition of desiccation.

Thermal Coefficient of Concrete.—Figures 2 and 3 show the effect of time on the coefficient of concrete bars where different aggregate is used. Except where noted on the figures all the concrete was made as follows: Mix 1:4.7, fineness modulus 4.01, consistency about equivalent to a 1-inch slump. normal Portland cement was used.

The curves are of about the same general shape for concrete as for neat cements. The coefficients are lower but any change of coefficient with time is probably due to changes within the cement-paste part of the concrete and not to the aggregate. The coefficient of the bar made with Portland-cement clinker gives some indication of what the unhydrated centers of clinker grains contribute to a hardened-cement-paste coefficient of expansion. In the same way as with hardened neat cements, but to a lesser degree, the coefficient of either water-saturated, or of desiccated-gel concrete is lower than where the gel is expanded but not saturated with water.

Table I shows the degree of lowering of the coefficient of thermal expansion by saturating cement or concrete bars with water.

Table I.—EFFECT OF SATURATION WITH WATER ON THERMAL COEFFICIENT

Type of Bar	Thermal Coefficient	
	At age of 9 months before saturation	After soaking in water 1 week
Portland-lime masonry cement	0.0000104	0.0000053
Normal cement	.0000103	.0000057
Flint concrete	.0000081	.0000049
1 cement : 1 sand mortar	.0000092	.0000063
High tricalcium silicate cement	.0000114	.0000056

Extreme drying (Table II) has the same effect as age by desiccating and hardening the gel structure. Absorption of moisture after drying by creating fresh gel may again raise the coefficient.

The results in Table III indicate that storage in liquids like kerosene and glycerine has practically no effect on the thermal coefficient such water does. It was also noted that there was no expansion or contraction of the bars at constant temperatures while stored in kerosene or glycerine, indicating that these liquids do not become integral parts of the cement gel structures as does water.

In Table IV is given the average results on nine cements containing both high and low C_3S cements of steam treatment with inclosed covers for 24 hours at 205 degrees F. After steaming inclosed air storage was used to the end of the test.

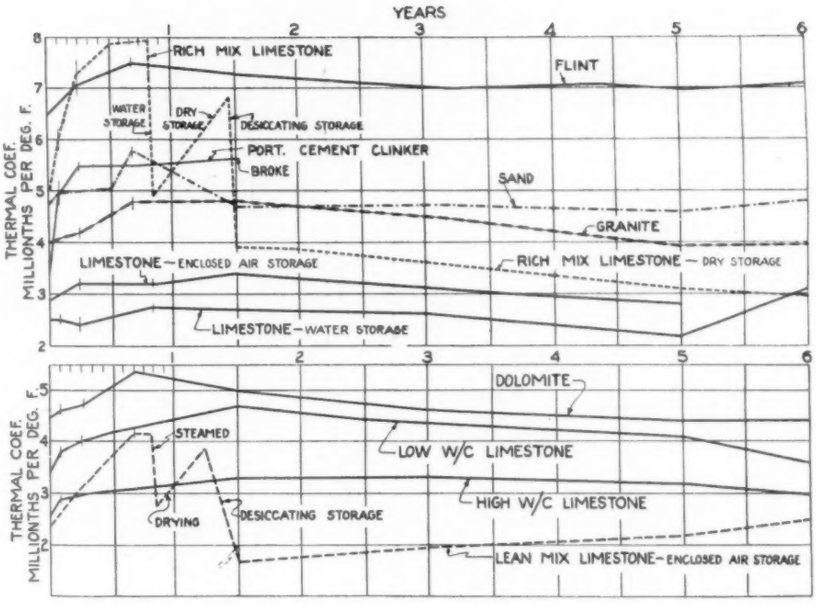


FIGURE 2. THERMAL COEFFICIENT OF EXPANSION OF CONCRETE

Mix, 1:4.7, except for the rich limestone mix (upper figure) which was 1:3.1, and lean mix concrete (lower figure) which was 1:7.5. Inclosed sealed air storage, except for rich-mix limestone and limestone stored in water, and for a part of the storage time of lean mix concrete. Aggregates graded from 100 mesh to ½-inch size; fineness modulus, 4.01. Consistency equivalent to a 1-inch slump, except for high W/C concrete which was about 7-inch slump and low W/C concrete which had practically no slump.

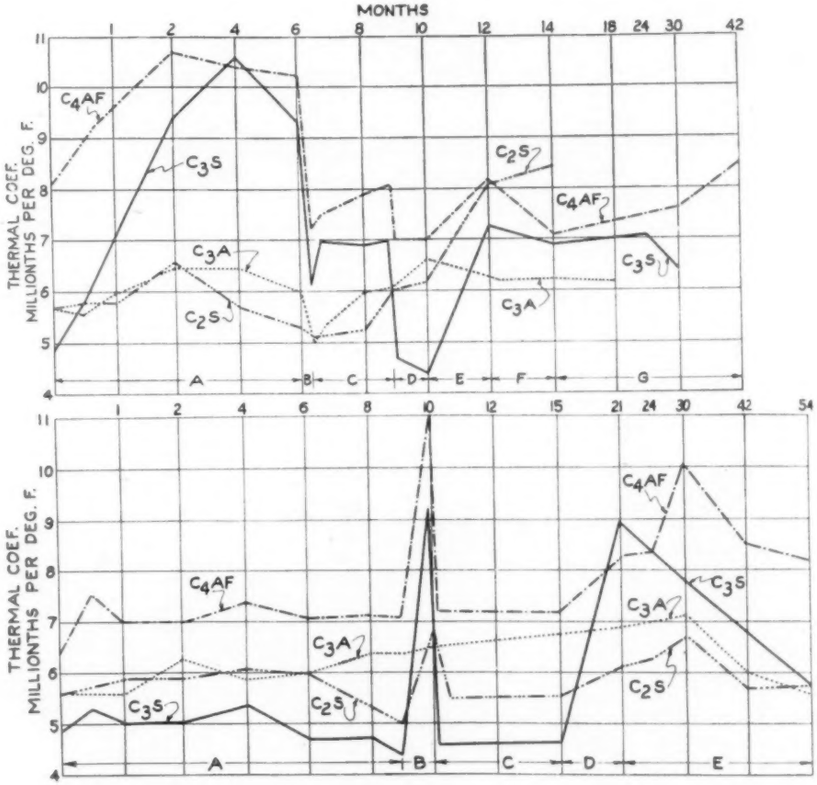


FIGURE 3. THERMAL COEFFICIENT OF EXPANSION OF THE FOUR MAJOR COMPOUNDS IN PORTLAND CEMENT

UPPER GRAPHS—A. Normal or inclosed air storage. B. Stored in vacuum over quicklime. C. Stored in circulating inclosed moist air. D. Water storage. E. Stored in inclosed moist air. F. Stored in inclosed air in equilibrium with Epsom salts, vapor pressure 4.9 mm. G. Stored in circulating inclosed air in equilibrium with $CaCl_2$, vapor pressure 5.1 mm. and above.

LOWER GRAPHS—A, C. Water storage. B, D. Inclosed circulating dry air. E. Normal inclosed air storage.

Table II.—EFFECT OF EXTREME DRYING OR DESICCATION ON THERMAL COEFFICIENT

Type of Bar	Before drying	Thermal Coefficient	
		After drying at 100°C. for one week without covers	After several years in inclosed air storage
High-early-strength	.0000091	.0000060	
White cement	.0000104	.0000065	.0000067
Normal Portland	.0000094	.0000060	.0000067
Portland cement-lime masonry cement	.0000080	.0000037	
Limestone concrete	.0000041	.0000021	.0000022
Plastic Portland cement	.0000100	.0000059	

Table III.—EFFECT OF KEROSENE AND GLYCERINE STORAGE ON THE THERMAL COEFFICIENT OF NEAT-CEMENT BARS

Kind of Bar	Thermal Coefficient		
	Before soaking	After soaking in kerosene 4 months	After soaking in glycerine 3 years
Normal Portland	.0000106	.0000108	.0000100
Flint concrete	.0000076	.0000072	.0000072
Clinker—no gypsum	.0000112	.0000114	.0000101
Cement from slow cooled clinker	.0000119	.0000112	.0000105
High C_3S cement	.0000106	.0000116	*.0000118

*7 months in glycerine.

Table IV.—EFFECT OF STEAMING ON THERMAL COEFFICIENT

Age 5 weeks before steaming	5 weeks after steaming	6 months after steaming	14 months after steaming	4 years and 4 months after steaming
Average for 9 cements.				
.0000076	.0000059	.0000069	.0000087	.0000084
Bar autoclaved 2 weeks at 500 degrees F.				
.0000096	.0000053	.0000056	.0000069	.0000056

Steam treatment lowers the coefficient but it may be due to either aging of the gel structure or the presence of excess moisture as in water storage. Mild steaming does not completely hydrate the cement and later hydration forms new gel with a rise of the coefficient.

Table V.—EFFECT OF RICHNESS OF MIX ON MORTAR COEFFICIENT

Mix	Coefficient (average results up to two years)
Neat normal cement	.0000103
1 cement : 1 sand	.0000075
1 cement : 3 sand	.0000062
1 cement : 6 sand	.0000056

This did not occur to the same extent in the bar more completely hydrated at 500 degrees F. for two weeks as this treatment probably even hydrated all the dicalcium silicate. Since only one test bar was subjected to the 500 degrees F. test, the results here should be accepted with caution.

The one point of agreement of nearly all published results on the thermal coefficient is that it increases with richness of mix (Table V).

The C_3S and C_4AF both have high coefficients at a maximum; both these compounds develop gel rapidly. C_3S forms colloidal $C_2S \; x \; H_2O$ and C_4AF forms amorphous hydratetd calcium ferrite. The C_3S appears to be more sensitive to water saturation and also to drying out than any of the other compounds, but C_4AF is next in this property.

The C_2S which hydrates very slowly, shows a low coefficient with changing moisture storage until later ages when more gel is formed; even then it does not approach C_3S or C_4AF in sensitiveness to storage changes.

The C_3A hydrates rapidly, but its products are crystalline and show a continuously low coefficient and lack of sensitiveness to storage conditions.

Effect of Cement Condition on Bin and Elevator Capacities

To the Editor:

From our contacts with equipment engineers and field men who service the construction industry we learn that the growing use of certain finely-ground and some special cements adversely affects the capacity ratings of bulk-cement bins and bulk-cement elevators. Attention given to the subject at this time may prevent misunderstanding and may assure that contractors, when they know beforehand that they are going to handle special cements, will protect themselves by the purchase of adequate bin and elevator capacity.

Bin capacity and elevator ratings are based on standard Portland cement, weighing 94 pounds per cubic foot. Allowance is made in these capacity ratings for some fluffing, but there is not sufficient allowance to cover the finer-ground cements or conditions where the cement, due to the manner of handling, is fluffed to an abnormal extent. In other words, the capacity ratings are based on a standard range of compaction of the cement.

However, the cement may be aërated, or, because of its nature or the method of handling it, may weigh much less than 94 pounds per cubic foot. Certain cement in the loose condition may weigh as little as 60 pounds per cubic foot. High-early-strength cements are an example; they are more finely ground and will fluff much more than standard Portland. Naturally, when a cement is fluffed, it occupies more space per pound (or per barrel).

An example is cited from a recent Pittsburgh installation. This dealer has a three-compartment bulk-cement bin at one of his yards and when he fills it with standard Portland cement, he can place 355 barrels in each compartment. When he uses high-early-strength cement, he gets only 300 barrels, an immediate shrinkage of 15 per cent. in the capacity of the bin and the elevator. This installation is equipped with a 50-ton-per-hour elevator, but under the conditions cited the elevator rating drops to 42½ tons per hour with the high-early-strength cement. Expressed in another way, the high-early-strength cement in this case weighed only 79.9 pounds per cubic foot.

In another case, in Texas, a contractor complained that the elevators of a two-plant installation were not delivering the rated 30 tons per hour. Engineers from one of the equipment companies—not the one which furnished the elevators and bins—happened to be at the site and their investigation revealed that the particular kind of "standard cement" being used at this point was fluffing considerably, so much so that it weighed about 66 pounds per cubic foot. It was reported further that practically all the cement now being furnished by Texas mills is ground very fine and this contributes to its fluffing and its light weight.

Contractors should take these conditions into account when planning installations of bins and conveyors for bulk cement.

It is not the intention of this communication to reflect on cement quality, nor to "plug" for certain types of cement, nor to associate the problem with any specific make of equipment. We believe the situation interests all producers and users of bulk-cement bins and bulk-cement elevators, and is, therefore, of general importance to the industry.

Andrew W. Pitney
M. K. Mellott & Company
Pittsburgh, Pennsylvania

John McKinney has sold the business of the Shelton Sand & Gravel Company, Shelton, Washington, to Burt Hurst.

Demand for Agstone and Other Small Stone Necessitates Plant Changes

The truck in Hopkinsville quarry lifting a loaded bucket. Two other buckets at right are being loaded.

WHEN it was built in June, 1931, the plant of the Hopkinsville Stone Company, Hopkinsville, Kentucky, was regarded as one of the most efficient plants of its size in the crushed-stone industry. A single flexible plant with a capacity of 100 tons per hour of minus 1¼-inch material, it was able to produce efficiently any of the nine sizes of aggregates included in the state specifications. A complete description of this plant was published in the June 15, 1932, issue of PIT AND QUARRY. Since that time the state specifications for aggregates for all uses require smaller sizes and there has been a tremendous increase in the demand for agricultural limestone. Many changes had to be made to the plant to meet these demands and others were made from time to time to increase the general efficiency. Now most of the output of the plant is ½-inch stone for asphalt pavement and dust. Capacity is about 400 tons of each of these products daily.

The original revolving scalping screen was replaced in 1941 with a 4- by 14-foot Nordberg Symons 2-deck screen. In 1936 a Jeffrey 30- by 36-inch hammer-mill was installed and in 1938 a 36- by 36-inch Jeffrey hammer-mill was added. Both have Jeffrey-Traylor vibrating feeders. In 1939 a 4- by 12-foot Symons 2-deck screen and a 3-foot Symons short-head cone crusher were installed. The crusher was added to make possible the production of an adequate amount of the fine aggregate used for bituminous top surfacing and to provide a finer feed for the pulverizers.

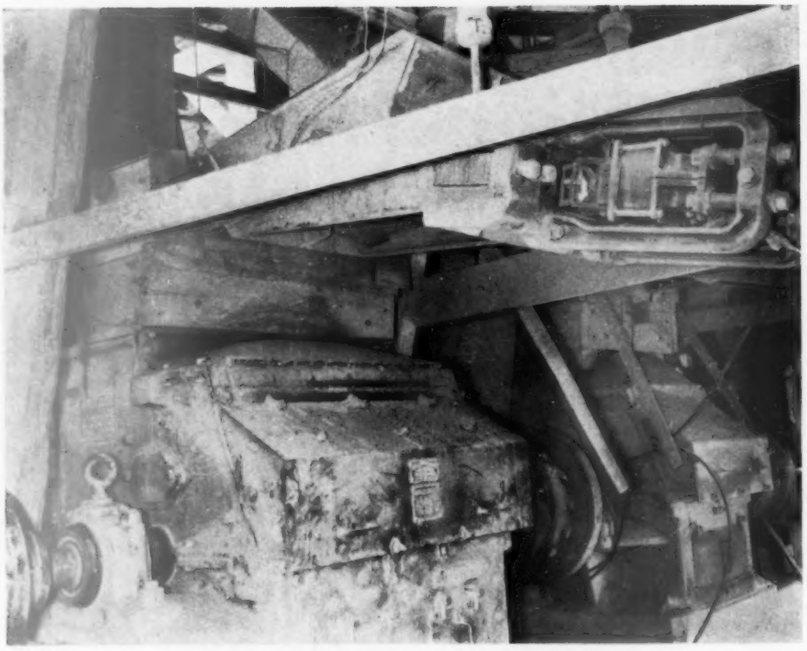
In the quarry a wagon drill is still used but the original Erie shovel has been supplemented by another Erie. A Marion shovel was added for stripping. Six Ford trucks are used to haul the rock to the plant, and these are depreciated and replaced every four years. The three older trucks have 1½-cubic yard end dump bodies. The other three newer trucks have 2-cubic yard Galion end-dump bodies without tail gates. Recently a Brooks Load Lugger of the latest type was installed to increase the output of the quarry. The length of haul averages about 800 feet and the crusher floor is about 90 feet above quarry level.

Stone is discharged from the trucks and buckets into the No. 7½ Austin primary gyratory crusher. A bucket elevator feeds the 4- by 14-foot Symons screen from which oversize is returned to the original 3-foot Symons standard cone crusher. Product of this crusher goes to the same elevator. The intermediate size of stone from the screen goes into a bin and the undersize goes to the 4- by 12-foot Symons screen. All products of this screen are discharged into some of the six 75-ton capacity bin compartments. Shipments are made by truck and railroad.

Under two of the bin compartments are the two hammer-mills and their Jeffrey-Traylor vibrating feeders. Minus ¾-inch stone is usually fed to the 30- by 36-inch mill and stone of up to 1½-inch size goes to the 36- by 36-inch mill. Individual bucket elevators feed the minus ⅛-inch mill products into bins for loading. Fineness far exceeds government requirements of 90 per cent. through 10 mesh and the $CaCO_3$ content averages over 94 per

A bucket-load of stone being dumped into primary crushing hammer-mill at Clarksville plant.

Hand-picked stone for special use being discharged into cars near Clarksville quarry for shipment.



The two hammer-mills in the Hopkinsville plant with their electric vibrating feeders above.

cent. as compared to the 80 per cent. minimum requirement. Most agstone is sold in September and October but there is a steady year-round demand. This department is entirely independent of the rest of the plant.

Christian County, in which this plant is located, is said to use more agricultural limestone than any other county in the state and, perhaps, in any other state. When the plant was built there was almost no demand for this material. The increased use of agstone has greatly improved the quality of local farm products and has increased the output per acre.

The Hopkinsville plant with truck discharging from ramp.

Early in 1938 an affiliate, the Clarksville Stone Company, was formed and a new plant was built near Clarksville, Tennessee, about 26 miles south of Hopkinsville. It has an hourly capacity of 20 tons of agstone and 30 to 40 tons of road stone. The stone in this deposit possesses a $CaCO_3$ content of 97.5 per cent.

Loading in the quarry is done by hand into the four 1½-cubic yard skip buckets of a Brooks Loadlugger mounted on a Ford chassis. The one-man-size stone is dumped at the plant direct to a Jeffrey 36- by 36-inch Miracle Type B hammer-mill with extra-heavy hammers. A bucket elevator feeds the mill product on a 4- by 10-foot Niagara 2-deck screen brought from the Hopkinsville plant. Products of the screen go into bins for truck loading. Ordinarily the hammer-mill is equipped with 3- or 4-inch screen bars but when agstone is to be the sole product ⅛-inch bars are used. In the latter case the finished agstone is discharged from the elevator direct into bins. At both plants the surface of each truckload of agstone is sprayed with water to prevent loss in transit.

Outdoor Advertising Brings in Business

Motorists on New Jersey State Highway No. 6 have been greeted for many years by the roadside signs of Alan Wood Company, Dover, New Jersey, past whose entrance drive this heavily-travelled highway runs. Primarily an iron mine, the operation produces considerable non-ferrous granite rock which was formerly wasted.

The management decided to investigate the possibility of marketing this rock as crushed stone, grit, stone sand and stone flour. Extensive research showed that there was a market for accurately-prepared sizes, so equipment was installed and the company was in the crushed-stone business. Shortly afterward a tar plant was added for the manufacture of ready-mixed cold patch.

The company has built an enviable reputation as a producer of high-quality stone products and has developed many new outlets and uses for special sizes and mixes in factory production as well as in highway and building construction.

This is a typical painted highway sign of the Alan Wood Company beside New Jersey Highway No. 6. Note telephone number on the sign.

The painted signs, first erected about six years ago, are credited with new business that far more than justifies their cost. They are redesigned and repainted frequently.

At the right a truck-load of sand coming out of the entrance driveway of the Alan Wood Company. At the left is a painted sign calling attention to Alan Wood Company's cold mixed bituminized mixture. Again, at the right, is a painted sign calling attention to the fact that this is the entrance to the plant.

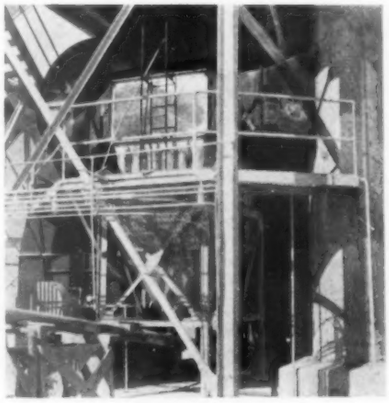
General view of the plant with lime kiln in foreground. At left is the traveling crane used for unloading and handling the shells.

SEA-WATER MAGNESITE PLANT IMPROVED

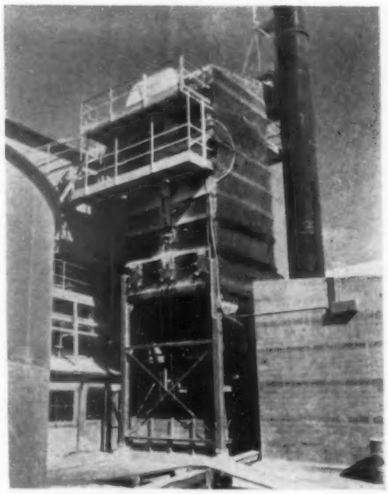
WHEN the Westvaco Chlorine Products Corporation built its plant at Newark, California, in 1937 many producers of nonmetallic minerals sat up and took notice because this plant was making lime, gypsum and magnesite from sea water and oyster shells. Operations were described in detail in the May, 1938 issue of PIT AND QUARRY. In spite of the fact that this company was a pioneer in this field with little accumulated experience to draw from, few mechanical changes have been found necessary. There has, however, been a shift in the relative demand for the various types of products made which has required the installation of additional equipment. Some refinements in existing departments and equipment have also been made. In this article an attempt is made to bring our readers up-to-date on this plant.

The plant is located near the shore of San Francisco Bay about 25 miles south of Oakland and near inexhaustible supplies of oyster shells. Bittern, a waste brine left after salt is removed from seawater by solar evaporation, is obtained from salt plants in the immediate vicinity. The plant was originally devoted primarily to the manufacture of dead-burned magnesite used as a refractory for open-hearth steel furnaces. Light-burned products for special uses were of secondary importance.

The capacity of the original Traylor 11- and 7- by 190-foot magnesia kiln was 50 tons of dead-burned magnesite in 24 hours. As a by-product of the rest of the system 75 tons of gypsum was produced. Since the plant went into operation there has developed a shortage of sources of high-grade magnesia for refractory uses. Because of this condition the production of the refractory kiln has been switched to a large extent from dead-burned magnesite to the No. 90 grade periclase used in the manufacture of refractory brick. There has been no change in the kiln capacity.



The dust-collector on the 315-foot rotary lime kiln.



The electrical precipitator on the 190-foot magnesia kiln.

There has also been an increase in the demand for other refractory grades and for light-burned magnesite. In order to meet this demand a 6- by 100-foot rotary kiln was added in January, 1940. This kiln was brought from the company's natural-magnesite plant near Porterville, California. Now it is used for making light-burned products, leaving the large kiln free for the production of the refractory grades. The new kiln has an output of 25 tons daily and its installation has also resulted in an increase in the production of gypsum to 100 tons daily. Various grades of light-burned magnesite are used for chemical purposes for water treatment, in the manufacture of 85 per cent. magnesia pipe covering, etc. Much of the gypsum goes to cement plants and some is sold for chemical uses. Features of this product are its purity, uniformity of composition and physical properties.

The Traylor 7½- by 315-foot rotary lime kiln, when installed, had a capacity of 97 tons in 24 hours. Oil was used as fuel. Natural gas is now used and, by various minor changes, the kiln's capacity has been increased to 110 tons daily. The kiln feed consists of raw shells containing 18 per cent. moisture. A burning temperature of 1,600 degrees C. is maintained. The lime is used to a large extent in the plant for precipitating magnesia from the bittern. Lime is also being sold to paper mills, for water treatment, etc.

In the slaking department, where the magnesium-chloride brine is reacted with milk-of-lime, new equipment was installed to handle the increased output of the kilns. This included a second Traylor 10- by 36-foot rolling barrel to insure complete reaction. A second Raymond No. 1 automatic throw-out pul-

(Continued on page 47)

CRUSHER FINES IN BITUMINOUS MIXTURES

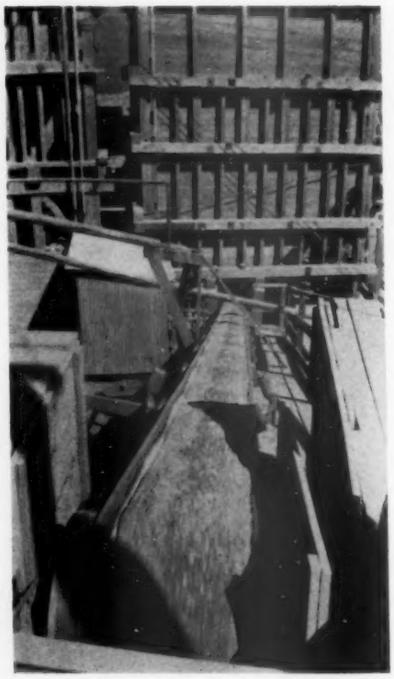
By ROYAL E. FOWLE
Engineer and Production Manager
Granite Rock Company

THE Granite Rock Company of Watsonville, California, with a quarry at Logan in Chittenden Pass, has produced crushed rock since 1899. The stock-piles are located approximately 4,000 feet from the quarry. In 1931 a plant was built at the rock-storage location for the sole purpose of re-sizing and dry-cleaning the stock-piled crushed rock, as well as material from the quarry plants. In 1937 this dry-cleaning, re-sizing operation was converted to one of re-sizing and washing. This plant at the stock-pile offered an excellent opportunity to utilize some of the available plant facilities, such as the material-receiving pit, the pan-feeders and the main conveyor, in the construction and operation of a plant for the production of plant-mixed surfacing and asphaltic concrete.

Such a plant was built in 1934 by the Central Supply Company, a subsidiary of the Granite Rock Company. W. H. Taylor of the Central Supply Company was in charge of the design and construction. It is a rock-washing and re-sizing plant. The general arrangement of these plants is shown in the accompanying drawing.

Rock dumped into the 180-ton capacity receiving pit is carried by a 24-inch 18-degree conveyor to the rock re-sizing and washing plant, where it is by-passed down a 45-degree chute to a four-compartment bunker which nominally holds ¾- to ½-inch, ½- to ¼-inch, ¼-inch to 10-mesh, and 10- to 200-mesh sizes. The approximate mix proportions of the required sizes are fed from the bottom gates of this bunker to an 18-inch 18-degree conveyor, which discharges into the Madsen plant drier.

The percentage of moisture in the rock is practically nil during the summer months, or dry season, of the year. During the winter months the rains wet the large uncrushed quarry rocks and cause the crushed sized material to show a small percentage of moisture. During this time the minus 10-mesh material, or crusher "fines," shows a greater increase in moisture due to the greater surface area and slightly higher percentage of absorption when compared with the stone sizes.



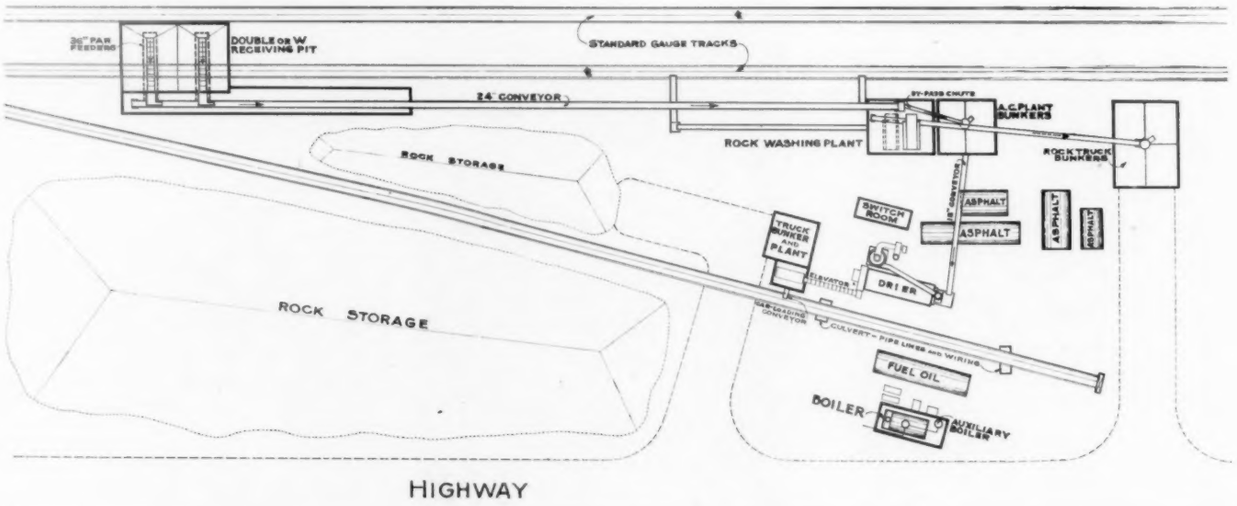
Conveyor discharging to rotary drier.

Dry material going through the drier for plant-mixed surfacing is heated only to facilitate mixing with the liquid asphalt. A low, or spot, fire is used at this time. The slightly damp material produced during the winter months is heated to a higher temperature; high enough to remove the moisture, but low enough to meet the requirements for plant-mixed surfacing. A higher degree of heat is used in the production of asphaltic concrete.

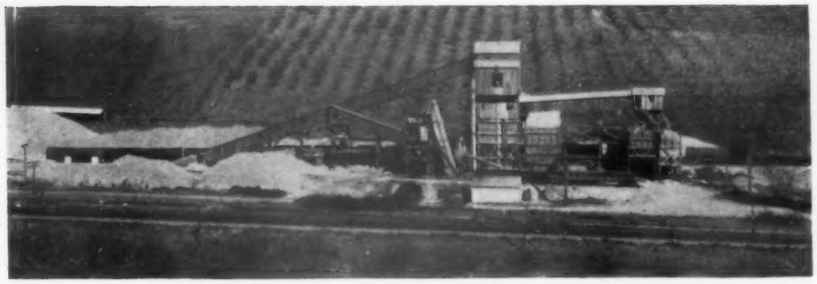
The heated material is discharged to a bucket-elevator which carries it to a 3-foot by 10-foot Symons 2½-deck sizing screen located at the top of the Madsen plant. As usually practiced, the sized material then passes to bins directly under the screen. From this point it is weigh-batched in accordance with the mix design and discharged to a pug-mill, where the required amount of liquid asphalt is added under pressure. The mixed material then goes from this pug-mill to a hopper which discharges it on an 18-inch shuttle conveyor. This, being movable and reversible, can discharge to either the truck bunker or to a railway car or truck.

Plant-mixed surfacing is shipped by either trucks or trains. Asphalt concrete has been trucked considerable distances, using heavy tarpaulins for covering the loads to cut down the heat loss.

Fuel oil for the plant boiler and drier is stored in a 13,000-gallon tank. Various grades of asphaltic cements and



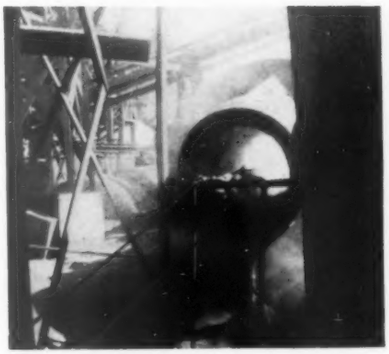
Diagrammatic sketch showing the asphalt plant, material storage and conveyors.



General view of the plant and appurtenant equipment.

liquid asphalt are stored in steam-coil-heated tanks. A 50-horsepower boiler supplies the steam through jacketed pipes to the tank coils and the drier burner atomizer, as well as a small super-heating tank placed between the storage tanks and the pug-mill. A small auxiliary boiler, using coal for fuel, is used to build up steam pressure for the oil-burners on the plant boiler. This auxiliary boiler, which takes the place of the usual air-compressor in firing operations, is shut down as soon as the main boiler develops sufficient pressure to operate its burners satisfactorily.

The plant-mixed material is widely used for street and highway maintenance work, as well as for new pavement construction. It is also specially suited to the construction of new smooth riding surfaces on old, rough pavements. It is also used in the paving of parking lots, driveways, tennis courts, factory floors, filling-station areas, markets, sidewalks, etc. The asphaltic concrete is used within suitable trucking distances for the paving of streets, highways, parking lots, markets, filling-station areas, driveways, etc. The addition of this plan for the manufacture of bituminous mixtures is supplemental to our quarrying operations, providing an additional market for sized material and crusher fines. It not only uses increasing amounts of the coarse sizes of crushed granite, which have been widely used in the past in asphaltic concrete and plant-mixed surfacing, but it also uses increasing amounts of granite crusher fines below 10-mesh, a material which formerly was largely wasted.



A view looking into the drier.

Reversible shuttle conveyor loading a railway car.

Some of the asphalt-plant equipment as seen from the washing tower.

This 10- to 200-mesh crushed material is not only exceedingly sound, but has a relatively low absorption when compared with other materials of this size commonly used in bituminous mixes. This low absorption of both the rock and the fines allows the use of less liquid asphalt for a given mix surface area. The use of the 100-per cent. crushed materials aids greatly in obtaining stable mixes and durable work.

All the company's plant-mixed material is made in conformity with the specifications set up by the Department of Public Works of the Division of Highways of the State of California.

Westvaco *(from page 45)*

verizer complete with separator and cyclone was also installed to aid in the preparation of the milk-of-lime.

Although the plant is located in a thinly-settled area, dust-collectors have been installed to improve the working conditions and to recover salable dust. Late in 1939 a Western Precipitation Corporation Cottrell electrical precipitator was installed between the large refractory kiln and its stack. It collects about 95 per cent. of the stack dust formerly wasted. The dust has a fineness of nearly 100 per cent. through 200-mesh and 85 per cent. through 325-mesh.

In February, 1940 a Western Precipitation Corporation Multiclone was installed on the lime kiln, where the stack dust is considerably coarser.

Other improvements made include the installation of Waukesha gasoline-engine auxiliary drives for the two large high-temperature kilns. These will turn the kilns when power-line repairs are made or during any other emergency. No such precaution was considered necessary for the small light-burning kiln, which operates at a much-lower temperature.

The efficiency with which this plant is operated is due in great measure to the system of permanent records of plant operations which has been developed. Chemical and physical tests are made regularly at strategic points in the plant flow. These records are entered on individual dual cards, from which they are transferred to permanent charts with space for 3 months' records on each side. On these charts are curves for kiln temperatures, speeds, rates of feed, quality of products, etc. Wherever unusual variations occur explanations for them are written in. This system makes it possible to guard against recurrences of these troubles and to define operating conditions more clearly than would otherwise be possible.

By E. W. REED-LEWIS

Tentative Procedure for Determining the Relative Plasticities of Cements

THE term "relative plasticity" is herein applied to certain values which appear to express the relative capacities of cements to yield "workable" mortars or concretes; "workable" being understood to signify "non-segregating, and of a desired degree of mobility."

The term "mobility" is herein applied to that property of concrete which determines the ease with which it can be molded. This property is considered to be the product of two distinct factors: "wetness" and "fatness."

Certain types of modern concreting practice demand high degrees of mobility, in seeking which the "wetness" factor is often allowed to become excessive, resulting in objectionable "bleeding", and grosser phases of segregation. Considerable attention has consequently been directed toward an increase of "fatness" by various means, so that "wetness" may be kept within appropriate bounds.

Systematic study of this subject has been hampered by lack of suitable methods of measuring the properties involved; the procedures herein described are an attempt to reduce this handicap.

The Mobility Gage.—This apparatus, illustrated in Figure 1, is used in attaining a standard degree of mobility with mortars. It was adopted for this purpose, in preference to other apparatus, because it seemed to measure more specifically the property under consideration, and with ample sensitivity.

The apparatus consists of a vertically-mounted plunger and a cylindrical brass cup of specific dimensions. In operation it is manipulated much in the same way as the Vicat apparatus. The capacity of the cup is three times the total displacement of the plunger head. The plunger is loaded to 1 gram per square millimeter of its end area, a total weight of 1,520 grams.

Intrusion of the plunger head into the cup obviously involves extrusion of an equal volume of mortar through the annular space between the plunger and the wall of the cup. It is apparent, therefore, that the weight of the plunger must overcome the resistance of the mortar to both shear and flow; and that, because sliding friction is also involved, the total resistance increases with the depth of intrusion. The mortar is considered of "standard mobility" when the plunger intrudes to precisely half the depth of the cup, which is indicated when the pointer reads 50 millimeters on the scale.

Shortly after this article was written Mr. Reed-Lewis was stricken with an illness from which he did not recover. He died on May 29, 1940. In an earlier article (P.&Q., August, 1938, pages 38-40) he discussed "The Relative Water Capacities of Portland Cements".—*Editor.*

●

Neither the slump cone nor the flow table measures a property analagous to mobility. Mortars of equal mobility will therefore not necessarily be of equal "slump" or "flow", though apparently they would be, if of equal "fatness."

Summary of Test Procedure.—Using a standard grading of Ottawa silica sands, and a mix of 1:3 by weight, three distinct determinations are made:

(1) The water-cement ratio that yields standard mobility.
(2) The density, in grams per cubic centimeter of mortar of standard mobility.
(3) The water-cement ratio that yields "Zero Bleeding."

From these three determinations are derived the following values:

(4) "Relative yield"—cubic centimeters of mortar per gram of cement at standard mobility.
(5) "Water mortar ratio"—cubic centimeters of water per cubic centimeters of mortar at standard mobility.
(6) "Relative wetness of mortar" at standard mobility.
(7) "Relative fatness of mortar" at standard mobility.
(8) "Relative plasticity of cement."

Since entrained air is frequently an important source of "fatness", and is generally believed to influence other properties of mortar or concrete to a significant degree, it will usually be desirable to determine the quantity present. This requires a knowledge of the specific gravities of the other ingredients of the mortar, so that their absolute volumes can be computed.

Details of the foregoing test procedures, and of the computation of the derived values, are given in the Appendix hereto.

Discussion.—The validity of any application of the theorem that mobility is the product of wetness and fatness, of course, depends on the choice of appropriate measurements with which to express its rather ambiguous terms.

"Wetness" must certainly be related to the water content of the mortar, but it seems equally clear that "free water", readily expelled in the form of "bleeding", contributes proportionately more to the "wetness" of the mortar than does the "bound water" which is more firmly retained. In other words, a given water content can contribute different degrees of "wetness", depending on what the "water capacity" of the mortar happens to be.

To obtain a value which expresses the "relative wetness" of the mortar, it is therefore necessary to modify its actual water content by a factor that expresses the degree to which this content exceeds, or falls short of, the capacity of the mortar to retain water. This factor is obtained by dividing the water-cement ratio that yields "standard mobility" by the water-cement ratio that yields "zero bleeding." Multiplying the "water-mortar ratio" by this factor, gives the "wetness" value adopted in this procedure.

Having chosen a seemingly appropriate measurement for "wetness", it is evident from the theorem on which the procedure is based that "fatness" will be expressed by the reciprocals of the "wetness" values when "mobility" is a constant.

Segregation being the result of excessive "wetness", it appears that the "non-segregating" essential of "workable" concrete is derived from the property of "fatness." Consequently, the relative capacity of a cement to produce workable concrete, herein referred to as the "relative plasticity" of the cement, is expressed by multiplying "fatness" by "relative yield."

The validity of this entire procedure can best be appraised by the rationality of the results obtained, when compared to experience in the field with like materials. The test values tabulated herewith (Table I) are intended to serve simply as examples, scattered over a fairly wide range of cements. They also illustrate the influence of several different admixtures on the plastic properties.

Practical Applications.—The use of

these test procedures should be helpful to the cement manufacturer in developing or choosing appropriate means to regulate the plastic properties of his products. For example, in comparing different plasticizing agents it is evidently desirable to use quantities of each that will give the same degree of plasticity as a basis for the further necessary tests to determine their relative effects on other significant properties of the cement. In this connection a systematized test procedure has obvious advantages over haphazard guess work, or reliance on the qualitative judgment of an operator.

A knowledge of relative plasticity values should also be helpful to the concrete engineer in choosing a suitable type of cement for the work in view. For example, cement Number 1 (in Table I) might be well suited to certain classes of mass concrete that do not require a high degree of mobility; but either Number 3, Number 4, or Number 5 would be a much better choice for thin sections, intricate form work, or heavily-reinforced structures, where a high degree of mobility is necessary and excessive "wetness" is a serious fault. Further to illustrate this point Figure 2 shows that at "zero bleeding" in the 1:3 graded sand mix, cement Number 4 had a substantial slump due to its high water capacity, whereas Number 1 had practically none.

It should not be inferred from any references herein that a condition of "zero bleeding" is considered an essential in all field concrete. Experience can alone determine what degree of "bleeding" is permissible on different classes of work.

It is suggested, however, that a modification of the "zero-bleeding" test might well be developed as a basis for the field control of bleeding. For this purpose, a wide-mouth Mason jar of half-gallon capacity could be used in place of the 11-ounce jar specified herein; this should allow the testing of mixes containing coarse aggregate up to 1½ inch.

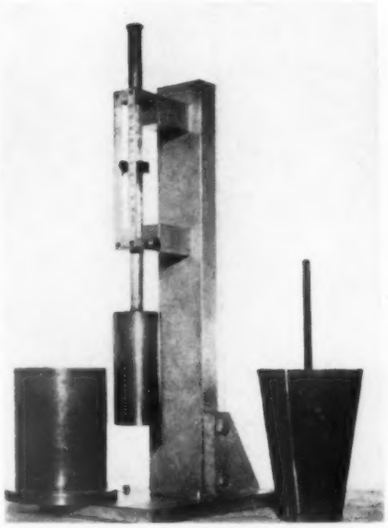


Figure 1—Mobility gage, cup and cone and rod for filling the cup.

Having tentatively decided on the materials and proportions of a field mix, and determined the W/C that yields the desired degree of mobility therewith, trial batches of the same materials and proportions would be mixed by hand, varying the water content to determine the W/C that yields "zero bleeding". The ratio of the W/C of the tentative field mix to the W/C of the "zero-bleeding" mix would then express the "bleeding tendency" of the field mix, and would be the basis on which the engineer would decide on its suitability with respect to "bleeding."

If experience indicates that the "bleeding tendency" of the tentative field mix is too high for the job in hand, appropriate adjustments would be made to lower it: (1) by changing the grading of the aggregate, or (2) increasing the cement content of the mix, or (3) substituting one or more sacks per batch of a cement of higher "relative plasticity", or (4) simply by reducing the water content of the mix and arranging to expend a little more effort in placing concrete of somewhat lower mobility.

Appendix

Standard-Mobility Test

Mixing.—The ingredients, in specified quantities, are mixed in an enamelware bowl of about 1-gallon capacity with the gloved hand as follows:

To a trial quantity of water, add 300 grams of cement . . . . . Mix 30 seconds
Add 150 grams of Ottawa "banding sand" . . . Mix 30 seconds
Add 300 grams of Ottawa "Number 30 sand" . . . . . Mix 30 seconds
Add 450 grams of Ottawa "standard sand" . . . Mix 60 seconds
Cover for 5 minutes. Remix 1 minute. Mold immediately.

Molding.—Immediately following the 1-minute remix the mortar is introduced into the Number 3 cup through an inverted slump cone of suitable dimensions, stirring it through the cone with a 5/16-inch brass rod, and raising the cone slowly as the cup fills. The surplus mortar is struck off level with a trowel or other straight-edge. The outside of the cup is wiped clean, and the cup and its contents are weighed to the nearest gram without unnecessary jarring.

Use of Mobility Gage.—The weighed cup containing the mortar is centered under the plunger. The plunger is clamped with its face just in contact with the surface of the mortar, when the pointer should read zero on the scale. The plunger is quickly released by loosening the clamp screw, and the depth of intrusion is read on the scale 30 seconds after release. Trial batches are made, varying the quantity of water, until an intrusion of 50 millimeters is obtained. When one trial batch gives an intrusion of not less than 35 millimeters, and another batch with more water gives not more than 65 millimeters, the quantity of water that should give the desired intrusion of 50

Table I.—EXAMPLES OF "RELATIVE PLASTICITY" DETERMINATIONS

No.	Description	A W/C at Standard Mobility	B Density at Standard Mobility	E W/C at Zero Bleeding	G Relative Yield	J Per Cent Air in Mortar	K Water-Mortar Ratio	M Relative Wetness	N Relative Fatness	P Relative Plasticity of Cement	Z Cubic Feet Air per 94-Pound Sack
1	A Portland of low R.W.C.	.502	2.24	.40	2.01	2.7	.250	.314	3.18	6.4	.080
2	A Portland of normal R.W.C.	.530	2.17	.44	2.09	5.0	.254	.306	3.27	6.8	.155
3	A H.E.S. Portland of low R.W.C.	.515	2.22	.53	2.03	3.2	.253	.246	4.07	8.3	.097
4	A H.E.S. Portland of high R.W.C.	.516	2.20	.57	2.05	4.1	.251	.227	4.41	9.0	.123
5	A H.E.S. with "dispersing agent"	.500	2.20	.57	2.05	4.5	.244	.214	4.67	9.6	.127
6	A blend of 86% No. 2 & 14% Rosendale.	.519	2.12	.45	2.13	7.5	.243	.280	3.57	7.6	.237
7	A blend of 80% No. 2 & 20% No. 11.	.492	2.05	.45	2.19	11.2	.225	.246	4.07	8.9	.370
8	A blend of 60% No. 2 & 40% No. 11.	.483	1.96	.46	2.29	15.3	.211	.222	4.50	10.3	.529
9	A blend of 40% No. 2 & 60% No. 11.	.480	1.91	.47	2.35	17.4	.205	.209	4.78	11.2	.620
10	A blend of 20% No. 2 & 80% No. 11.	.483	1.87	.49	2.40	19.2	.201	.200	5.00	12.0	.694
11	A Portland ground with .05% resin.	.493	1.84	.50	2.44	20.3	.202	.199	5.03	12.3	.744
12	No. 2 plus .05% of a "mineral soap".	.517	2.05	.44	2.20	10.6	.235	.276	3.62	8.0	.350
13	No. 2 plus .10% of same mineral soap.	.494	1.97	.46	2.28	14.6	.217	.233	4.29	9.8	.502
14	No. 2 plus .15% of same mineral soap.	.484	1.92	.47	2.34	17.0	.207	.213	4.69	11.0	.600
15	No. 2 plus .20% of same mineral soap.	.479	1.89	.49	2.37	18.5	.202	.198	5.05	12.0	.658
16	No. 2 plus .25% of same mineral soap.	.476	1.85	.51	2.42	20.3	.197	.184	5.43	13.1	.740
17	No. 2 plus .0025% of a "wetting agt.".	.492	1.99	.44	2.26	13.8	.218	.244	4.10	9.3	.468
18	No. 2 plus .0050% same wetting agent	.478	1.91	.45	2.33	17.2	.205	.218	4.59	10.7	.605
19	No. 2 plus .0075% same wetting agent	.467	1.87	.47	2.39	19.6	.196	.195	5.13	12.3	.702
20	No. 2 plus .0100% same wetting agent	.459	1.85	.48	2.41	20.7	.190	.182	5.49	13.2	.750
21	No. 2 plus .0125% same wetting agent	.456	1.85	.49	2.41	20.7	.189	.176	5.68	13.7	.750
22	A masons' cement ground with resin	.505	1.88	.64	2.40	17.2	.211	.166	6.02	14.5	.....
23	A blend of 67% No. 2 & 33% No. 25, by weight	.598	2.18	.57	2.10	1.9	.284	.298	3.36	7.1	.....
24	A blend of 50% No. 2 & 50% No. 25, by weight	.640	2.16	.66	2.15	1.2	.298	.289	3.46	7.4	.....
25	A masons' hydrate	.779	2.07	1.01	2.31	0.9	.337	.260	3.85	8.9	.....

Note: Column "J" shows the percentage of air in the 1:3 mortar at standard mobility. To facilitate an estimate of the amounts of air that would result in concrete, the entrainment of air being essentially a function of the cement-water paste, column "Z" shows cubic feet of air per 94-pound sack.

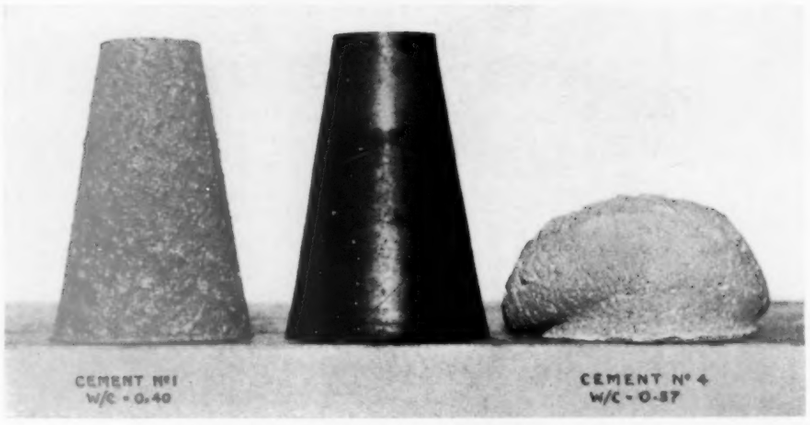


Figure 2—Slump test of 1:3 mortars at "zero bleeding."

millimeters may be interpolated, and recorded as the water-cement ratio by weight for standard mobility. All the operations should be controlled by a stop-watch, and be so timed that the plunger is released at precisely 10 minutes after the cement was added to the water. This timing allows rinsing of the mixing bowl and removal of the glove after filling the cup and before striking off the surplus mortar in the molding operation.

Test for "Zero Bleeding"

Mixing.—Reducing the above-specified batch quantities of cement and sands by one-third and mixing in an enamelware saucepan of 3- to 4-pint capacity with a metal (not aluminum) tablespoon, the mixing operation is carried out to the same time schedule as in the "standard-mobility test."

Molding.—Immediately following the 1-minute remix a clean, dry jar of specified dimensions is filled with the mortar in four layers, spading each layer 25 times with the tablespoon, or sufficiently to release all the air bubbles that are visible through the glass. Surplus mortar is struck off with a trowel or other straight-edge; the rim and thread of the jar are wiped clean; the cap is screwed on tightly and the jar immediately stood upside-down on a firm table or shelf. Thereafter, at intervals of 10 minutes, the jar is gently turned end for end, alternately clockwise and counter-clock-wise in the same vertical plane, so that any tendency to "bleeding" will be more clearly visible through the glass by causing it to travel repeatedly in the same channels as the jar is reversed.

Zero Bleeding.—Trial batches are made, varying the water content in increments of 0.01 W/C by weight, until the highest W/C is determined at which no sign of water travel has been visible up to the end of the fifth 10-minute interval. This determined water content is recorded as the W/C by weight for "zero bleeding", and is elsewhere referred to as the "R.W.C.8 value" of the cement.

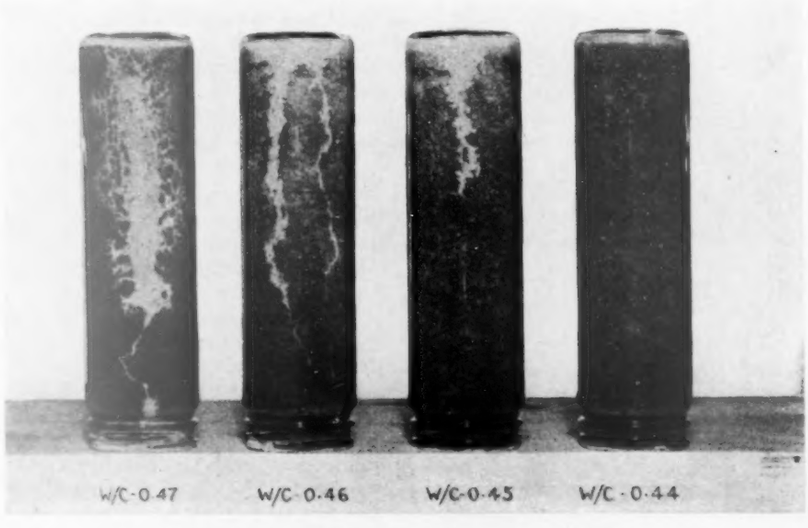


Figure 3—Zero-bleeding test with cement Number 2.

Symbols and Computations

A —W/C by weight for standard mobility (in grams of water per gram of cement).
B —Density of mortar of standard mobility (in grams per cubic centimeters).
C —Sum of batch weights of all ingredients at standard mobility (in grams).
c —Batch weight of cement (300 grams).
c′—Batch weight of sand (900 grams).
c″—Batch weight of water at standard mobility (in grams).
D —Sum of the absolute volumes of cement, sand and water at standard mobility (in cubic centimeters).
d —Absolute volume of cement (95 cubic centimeters if specific gravity is 3.15).
d′—Absolute volume of sand (341 cubic centimeters for Ottawa silica sands).
d″—Absolute volume of water for standard mobility (in cubic centimeters).
E —W/C by weight for zero bleeding (in grams of water in cubic centimeter per gram of cement).
F —Batch volume of mortar at standard mobility (equals C/B).
G —Relative yield of mortar at standard mobility (equals F/c).
H —Volume of air in batch at standard mobility (equals F minus D).
J —Percentage of air at standard mobility (equals $100 \times H/F$).
K —Water-mortar ratio at standard mobility (equals d″/F).
L —Relative "wetness" of water at standard mobility (equals A/E).
M —Relative "wetness" of mortar at standard mobility (equals $L \times K$).
N —Relative "fatness" of mortar at standard mobility (equals 1/M).
P —Relative "plasticity" of cement (equals $N \times G$).

Notes.—The type of screw-capped glass jar used in the test for "zero bleeding" is illustrated in Figure 3. The outside diameter of these jars is approximately 55 millimeters and the over-all height 200 millimeters. Such jars are made by the Hazel Atlas Glass Company, Wheeling, West Virginia, and are completely specified as follows:

"Jar No. 5546, 11 1/16 ounce capacity, 453 C.T. finish, complete with double-shell, black-coated caps, P. & H. lined."

Any jar of similar dimensions, equipped with a flat, water-tight screw cap, will, of course, answer the same purpose.

SOME FACTORS THAT INFLUENCE SAFETY

By A. J. R. CURTIS
Assistant to General Manager, Portland Cement Association

IT is amazing what progress industry has made in the prevention of accidents during the last two or three decades, and even more surprising when we realize that only here and there has scientific effort been put into the job.

The fact is that accident prevention in industry is succeeding in spite of the superficial handling so frequently given it. I do not want that statement to sound too disparaging for it is not meant so much in criticism as it is in appeal for a more scientific attitude toward this problem than has been generally taken heretofore.

Emotional appeals have carried the cause of safety a long way and they always will, because men are governed so largely by their emotions. We shout "Give Old Man Accident both barrels", "Black Out Carelessness," "Blitzkrieg Thoughtlessness", "Crawl out of your accident dog house and lead the pack"; we remind our listeners that roller bearings have replaced wooden wheels and that the snail of to-day travels faster than yesterday's rabbit. Good. These things employ and demonstrate the power of the emotional appeal. But often our emotional appeal is made without much of a basic philosophy behind it.

Far and wide, we have been content to let daily experience be our teacher. We have had to suffer an accident—or, maybe, a thousand accidents—to discover the underlying hazard. How many thousands of fingers were lost before we put guards on saws, how many eyes before we got serious about goggles? If we have had any philosophy about procedure it has been something like, "Have an accident to find a hazard". Of course, many people haven't been content to wait for accidents in order to find all their own individual hazards and some have grown very skilful at discovering individual hazards before they have borne their bitter fruits.

That portion of the cement industry in the United States and Canada which reports its accidents to the Portland Cement Association suffers some 200 personal-injury accidents a year among thirty-odd thousand men. We know well enough that we are surrounded by at least 10,000 hazards. If we had remained content to follow the "Have-an-accident-to-find-a-hazard" philosophy, we could not catch up with our hazards in the lifetime of this generation unless we increased our accident rate greatly. We don't like that prospect, so we got busy trying to find a way around it. But after devoting ourselves to a considerable research of the subject, we know now, better than we did a few years ago, that many hazards, among them possibilities for fatal accidents or even catastrophies, are undiscoverable in advance by any methods generally known to students of the techniques of accident prevention.

When the prophet of Islam was similarly confronted several centuries ago he announced that if the mountain would not go to Mohammed, Mohammed would go to the mountain. So P.C.A. determined that if we could not identify and classify for attack all these fearsome hazards on which our "total war" must be waged, we would get them by the blockade method, literally cutting off their supplies.

Since it is an impossibility to recognize or detect in advance all the detailed circumstances surrounding a prospective mishap, bearing in mind particularly that many new hazards are constantly entering the picture, would it not be a reasonable procedure to concentrate on a study of the general factors that govern safety in an industrial plant?

All the dangerous circumstances which surround a prospective accident pertain to: (a) men themselves, (b) conditions with which the men are surrounded, or, more often, (c) the combination of (a) and (b).

Then the general factors which control safety in an industrial plant include:

1. The dangerous circumstances just referred to, (a) + (b) + (c), and
2. Means available for use in wiping out these circumstances or in rendering them impotent.

We may expand these general factors as follows:

Dangerous circumstances that surround a prospective accident depend upon:

1. The quality of the employed personnel and the effectiveness of personnel selection, placement, training and supervision designed to develop and maintain a safe working force.
2. Condition of plant buildings, machinery, tools and other equipment; housekeeping.
3. Operating methods and practices.
4. The extent of executive interest.

Means available for use in dealing with these circumstances:

5. Quality of the safety organization, and effectiveness of the safety program.
6. Visual safety methods.
7. Safety by the spoken word.
8. Accident investigation and remedial measures.
9. Safety rules and regulations.
10. Standards of comparison for measuring efficiency of safety effort.

It is generally recognized that the first step in solving any problem is to set down: (1) the conditions that surround it, and (2) the means at hand for its solution. That is just what we have tried to do above with respect to the plant-safety problem. While no one of these factors is unknown as such to any qualified operating executive or safety director, few of the latter undertake the solution of the plant-safety problem by setting out these factors and then going about it to carefully analyze each one and its possibilities.

It is clear that each has a place in the accident-prevention picture, yet, through lack of systematic listing and appraisal, most industrial organizations overlook the influence of one or more of them. Many overlook or ignore several. Some give attention to all. Rarely is plant-safety work so well balanced that each is given its proper share of attention. Since that proportion may be expected to vary somewhat from plant to plant, each plant situation requires individual analysis.

The logical first step is to list, and to become well acquainted with, each of the more important factors and the principal components of each. When that has been done a great deal has been accomplished. One should next attempt an approximate evaluation of each factor as a part of the whole picture with which he is dealing. Then he may attempt an approximate evaluation of the emphasis *now* placed on each factor in the plant in which he is interested.

For example, the first of the possibly hazardous circumstances involves the quality of the employed personnel and the kind of handling it receives safety-wise. After carefully weighing this factor against the others, suppose we conclude that in the particular case being studied the personnel factor constitutes about one-fifth of the problem. If so, is 20 per cent. of the emphasis now given safety work in this plant directed toward personnel improvement?

Evaluating the Factors

Assuming 1,000 points for the ten factors, how many points would you assign to each individual factor? In the cement industry we started out by assigning the individual factors the following points, believed to represent

somewhere near an average proper weighting for each one under cement operating conditions:

1. Personnel quality and personnel management designed to develop and maintain a safe working force 160
2. Condition of plant buildings, machinery, tools and other equipment; housekeeping 160
3. Operating methods and practices 90
4. Executive interest 70
5. Quality of the safety organization, and effectiveness of safety program 100
6. Visual safety methods 110
7. Safety by the spoken word 90
8. Accident investigation and remedial measures 100
9. Safety rules and regulations 70
10. Standards of comparison for measuring efficiency of safety effort 50

These values may be changed to meet the individual circumstances or convictions. It is interesting to observe that as individual evaluators of a given situation, working independently of each other, become more experienced, their estimates tend to come nearer together.

If, on mature consideration, these trial weightings do not appear to meet the situation in the organization that is under consideration, the next step is to change them according to your best judgment. When this has been done, these corrected weightings become the yardstick against which the actualities of the plant accident-prevention work are to be measured.

How near does the organization being considered, come to reaching the "par" on each point which you have set up for it? To determine the answer, a careful estimate has to be made of the actual situation in the plant with regard to each point. In order to do so it is necessary to break down all these highly composite factors. Several of these, dealing with such complex considerations as personnel, the condition of the plant-safety organization and visual safety methods could be quite readily broken down into fifty or more sub-factors.

Within the limits of a single article it is, of course, quite impossible to deal with all these sub-factors, not to mention fractionating the components of the latter. But a thorough study of plant-safety activities, in order to arrive at the desired result, which is the control of the factors governing plant mishaps, must be carried out with completeness and exactness of detail. To whatever extent the study fails to penetrate the inner recesses of each factor and sub-factor, to that same extent there will be failure to gain absolute control over mishaps.

In order that those who are interested may have before them some material on each factor, the following questions regarding each are offered as a means of directing attention to some of the more obvious sub-factors. These questions must be answered by the reader for himself. The information needed in such cases is not generally of the kind that another can supply.

One is almost sure to find that he has a positive answer to many of these questions. He is almost equally sure to find that he must have the answers to them all for a reasonably complete solution of his problem. These questions may suggest others to which he realizes he should have the answer. After going through such a question list once, the careful student of plant-accident control will go over them again. To his surprise he will find certain questions which he will answer differently on second or third approach. Others in the organization should be invited to answer them — always individually — and the answers compared. A deliberate program of evaluation, over a period of weeks or months, may be anticipated for reasonably good results. Many believe such a program should be continuous.

Questions Relating to the Plant Personnel

1. Is it always made clear to prospective employees that the employer will not knowingly hire or retain a careless man?
2. Are the methods of hiring men at your plant satisfactory from the safety point of view?
3. Are newly hired men ever permanently attached to a department against the better judgment of the department head?
4. Is physical examination of employees in advance of permanent employment a requisite?
5. Do foremen give sufficient attention to the guiding of new employees?
6. Is safety instruction carefully and repeatedly given new men?
7. Are fellow workers encouraged to assist new workers in acquiring safe habits?
8. Are physical examinations repeated at suitable intervals?
9. Are foremen encouraged to study carefully the working habits of their men?
10. Are provisions made to supply foremen with information on modern methods of safety training of workers?
11. What proportion of the employees have been trained in first aid?

Condition of the Plant and Its Surroundings

1. Is a general inspection of the plant carefully made at monthly intervals?
2. Is a sufficient general inspection always made before resuming operations after shut-downs?
3. Are check lists provided for use in making inspections?
4. Are fully detailed reports made of inspections?
5. Is all electrical equipment subject to special inspection at regular intervals?
6. Are workers instructed to inspect hand tools before using?
7. Is the fire-protection equipment regularly inspected?
8. Is the quarry face adequately and regularly inspected?
9. Is the face always watched for loose rocks while men are at work dangerously near?
10. Have adequate methods of warning and escape been provided?
11. Are men working on the quarry faces always protected with effective lifelines?
12. Are adequate guards provided on or around all moving machinery?
13. Are stairs and floor openings effectively protected?
14. Are scaffolds safely constructed and guarded?
15. Is the lighting safe and adequate?
16. Is personal protective equipment adequate and is it properly used by the employees?
17. Are safety measures specified in new machinery and tool purchase orders?
18. Are employers' safety suggestions given careful consideration?

Operating Methods and Practices

1. Is the safety of workers given first consideration in formulating operating rules and regulations?
2. Do any present operating rules create safety hazards?
3. Is the plant operating schedule free from safety hazards?
4. Does "safety first" still prevail when the schedule includes rush and emergency work?
5. Are workers required to carry out all orders even if they believe their personal safety would be jeopardized by so doing?
6. Are "safe-practices" regulations checked frequently for revision?
7. Are routine operations studied frequently in the hope of discovering safer methods?

Executive Interest

1. Does the principal executive office see the reports of all personal-injury accidents with records of their disposition?
2. Are plant-safety meetings and celebrations planned so far as possible to allow executive attendance?
3. Are unusual safety accomplishments brought to an executive's attention and adequately acknowledged by the executive?

4. Does an executive review all the safety plans and advise on safety organization appointments?

5. Does an executive send frequent communications to the employees to quicken safety interest?

6. Does an executive take a personal interest in the effectiveness of the plant-safety paper?

Quality of the Safety Organization and of Its Program

1. Does the plant have an *active* organization guiding its safety efforts?

2. Do the department heads form the nucleus of this organization?

3. Are regular meetings held at least once a month?

4. Are minutes carefully kept of every meeting and a follow-up made at the next meeting?

5. Are special detail groups appointed as necessary to handle specific jobs?

6. Are all the plant-safety meetings convened and adjourned promptly?

7. Is the attendance at such meetings satisfactory?

8. Do all the safety activities clear through the safety committee?

9. Is the general safety program determined several months in advance?

10. Does the safety committee have a meeting place that is well lighted and ventilated, reasonably clean and attractive and provided with a conference table and comfortable chairs?

Visual Safety Methods

1. Are safety posters effectively used?

2. Are the poster and bulletin boards well located and kept clean and easily readable?

3. Are the employees encouraged to prepare bulletin-board material?

4. Are safety movies and sound slides used occasionally?

5. Is a plant-safety newspaper prepared regularly?

6. Are careful selections of National Safety Council literature made for plant use?

7. Are safety signs carefully edited and well placed?

8. Are safety signs kept clean and easily readable?

9. Is special attention given to the clearness and effectiveness of warning signs?

10. Are special campaigns developed, seasonally and otherwise, to maintain safety interest?

11. Does your plant employ contest ideas effectively?

12. Are safety buttons or certificates used?

13. Is a safety-bonus system in effect?

Safety by the Spoken Word

1. Do foremen interview their men personally to obtain the latter's safety views and to make sure that each is endeavoring to work safely?

2. Does the plant executive interview foremen frequently to make sure that they are carrying the safety message to the men regularly?

3. Are brief departmental meetings held at least every two weeks?

4. How well are such meetings handled and how well attended?

5. Do these meetings focus attention on the hazards and safety regulations pertaining to the particular department?

6. Is care taken that all the representatives of the department participate as frequently as practicable?

7. Are safety mass meetings held at least once a year?

8. Is at least one number on the program always furnished by a worker and at least one by a department head?

9. Is at least one meeting each year open to the families of the workers?

10. Are the meetings well attended?

Accident Investigation and Remedial Measures

1. Are all personal-injury and other serious accidents investigated by either a regular or a special plant committee (*i.e.*, more than one man)?

2. Is the adequacy of guards thoroughly investigated?

3. Are possible defects of the equipment, tools or materials carefully checked?

4. Is hazardous arrangement (deficiency of the surroundings) studied for possible bearing?

5. Is illumination (natural and artificial) taken into account?

6. Is insufficient ventilation considered as a possible cause?

7. Personal protective equipment may have a strong bearing. Is this checked?

8. Are the physical and mental capabilities of the injured considered?

9. Did the accident reveal whether the injured was lacking in a knowledge of the correct methods or in skill in using them?

10. Were the attitudes of the foreman, the injured and others considered as possible contributing factors?

11. Are the causes revealed in accident investigations immediately remedied at all points where similar accidents might occur?

Safety Rules and Regulations

1. Does the plant have an up-to-the-minute code of safety rules?

2. Is it available in convenient and inviting form?

3. Are the "must" rules plainly indicated in contrast to general suggestions for safe conduct?

4. Does the plant have a "must" rule against touching moving machinery?

5. Are the operators prohibited from making electrical repairs?

6. Do the "must" rules prohibit riders on railroad equipment, trucks and tractors?

7. Do the "must" rules require the injured to report at once for first aid?

8. Is work of an especially hazardous nature or that in especially hazardous locations controlled by special safety rules?

9. Do you know that all the employees are thoroughly familiar with the safety rules?

Standards for Comparing Efficiency of Safety Effort

1. Is an annual statistical analysis made of the plant and department accident records comparing them with those of former years?

2. Is a comparison made with the industry's and (or) the company's accident trends?

3. Is a comparison made over a five- to ten-year period?

4. Are all the department heads familiar with the industry's, the plant's and the department's accident trends?

5. Are the workers interested in, or informed on, the plant's and department's accident trends?

Data on Bond Between Concrete and Steel

Information concerning the strength of the bond between concrete and steel reinforcing bars, based on actual measurements of stresses in the steel, is available for the first time as a result of tests conducted at the National Bureau of Standards, the Department of Commerce has announced.

These tests, it is pointed out, are difficult to carry out, which probably accounts for the failure of most investigators to attempt them, although the importance of knowing the bond strength has long been recognized. If it were not for this adhesion between the concrete and the steel, the former would have but limited utility because of its low tensile strength. The reinforcing bars, which carry practically all the tensile loads convert it into an excellent material for most building purposes.

The bureau's investigation included tests of 18 cylindrical concrete pull-out specimens containing ¾-inch steel reinforcing bars. Each specimen had 12 one quarter inch openings in the concrete which extended down to the bars, thus permitting strain gage measurements to be made on the steel.

Overall elongations of embedded bars were measured in a similar series of tests on 18 solid specimens. These provided a check on both the strength and computed elongations of the bars in the perforated pull-out specimens.

Complete information on the stresses in the bars and their behavior under load was obtained.

By Z. H. MISCHKA

Legislation Affecting Quarry, Plant Owners Crops Up in Several States

A TREND toward economy apparent in most states where legislatures are meeting this year thus far has brought adjournment of three lawmaking bodies in record time, while majority leaders in a fourth state were claiming a national record for reducing expenditures under those of the past biennium.

Tennessee legislators, who used only 41 of the 60 days allotted them by their state constitution, were followed in establishing precedent by Wyoming and Montana, where lawmakers completed work before clocks reached midnight on the days marking their respective 40- and 60-day limits. This contrasted sharply with former sessions, when the final day often extended as long as a week while lawmakers frantically attempted to clean up their work.

While legislators of several states completed their business and returned to their homes during March, lawmakers in others had made relatively little progress on the hundreds, and in some cases thousands, of measures awaiting their consideration, and leaders were unable to estimate the probable date of adjournment. The Florida legislature will start a biennial session April 8.

Concern over the maze of legislation awaiting disposition in his state prompted one legislator to introduce a measure to require with every bill filed a $25 deposit to show good faith. If a bill passed both branches in substantially the same form in which it was introduced, the money would be refunded. If not, the money would be forfeited to the state. The deposit, said the author of the measure, would reduce the number of proposals advanced for political reasons without hope of final approval. The deposit bill is not likely to be approved by the $3-a-day legislators, who seem unwilling to risk their salary for 8⅓ days on likely failure of one of their bills.

Indiana's general assembly slashed the state's biennial budget approximately $5,500,000 from appropriations made two years ago, and provided for a balanced budget. A sharp reduction was made in the tax paid by retailers.

Legislative activity of particular interest to the sand, gravel and cement industries last month follows:

Arkansas—The legislature approved and sent to the governor for his signature a bill to allow the state to sell mineral rights after appraisal of its lands.

The governor signed into law a bill taxing and regulating itinerant merchants. It requires a license of $50 a year, and accompanying the license application must be penal bonds of $500 and $1,000, and a $5,000-$10,000 liability-insurance policy for injury or death of one or more persons and a $1,000 property-damage policy.

California. — The Senate committee on welfare and institutions approved a bill to appropriate $30,000 for the operation by prison labor of rock-crushing plants, with $5,000 of the amount to be expended for the purchase of tools, machinery and other material and appliances.

Illinois.—A new House bill, referred to the committee on judiciary, would create a surface-mining commission to establish regulations for the conduct of open-cut or strip mining of coal, sand, gravel, limestone or other mineral. Parties engaged in such activity would be required to obtain a license and post a bond guaranteeing restoration of the surface of the land to its former contour. The license fee would be $50, and the bond would be set at $150 an acre for land owned, leased or otherwise procured for the mining purpose.

Other new bills, none of which had progressed beyond committee, would give preference in the construction of public-works projects and improvements to citizens of the United States who have resided in Illinois for one year, and would require the use of only Illinois materials in the construction of such projects whenever such materials are obtainable in marketable quantities and are not of a quality inferior to those offered by competitors outside the state; would regulate the manufacture, possession, storage, transportation and use of explosives; would make it unlawful after October 1, 1941, to sell, distribute, generally deal in, use or operate any tractor within the state which has been manufactured or assembled after said date unless said tractor is equipped with safety devices or controls to prevent the engine from being cranked or started while the tractor is in gear, and would cause the tractor to be automatically stopped when the operator falls or is thrown from it; and would provide that laborers, material men and subcontractors shall have a right to file a claim for lien or a petition to enforce a lien in the same manner and within the same time limits as contractors now have under provisions of the act.

A public record of the names of owners of businesses and places of business would be required by a House bill, referred to the committee on judiciary.

Indiana.—The governor signed a bill to permit vehicles transporting explosives to be equipped with red lights similar to those used by ambulances.

Final approval was given a measure for a six-man commission to study the state's needs in wage-and-hour legislation. The group will make a report to the next regular session of the legislature in 1943.

The Senate committee on industrial development introduced a bill similar in intent to several others previously introduced, to provide that the state and its subdivisions shall use Kansas materials on state projects when they may be procured at a "reasonable" price. The committee bill is expected to gain preference over earlier measures.

Iowa.—A House bill, giving a favorable committee recommendation, would permit a county board of supervisors to sell material from county gravel pits to private parties "at not less than cost" to surface driveways and lanes connecting surfaced public roads and streets with lots and buildings. In explanation of the measure the author of the bill said: "It is very evident that during periods of wet weather a lot of mud is deposited on our highways by cars coming on to them from private drives. This bill would allow the boards to sell county materials to be used for surfacing driveways and lanes connecting surfaced public roads with other lots and buildings."

Kansas.—A new House bill would do away with the present practice of taxing undeveloped mineral rights. Mineral rights are currently taxed separately from surface holdings of land, and the tax, according to the author of the new bill, works a hardship on the mineral-rights holder.

The House state affairs committee recommended for passage a bill to regulate and license itinerant merchants. A similar measure passed the House two years ago, but failed in the Senate.

Michigan.—A new Senate bill would bring occupational diseases under the workmen's compensation act, and would require the furnishing of medical

care for one year following disablement. A House measure would regulate and license the manufacture, sale and disposition of explosives.

Montana.—Governor Sam Ford vetoed a bill that would have allowed counties to lease road machinery to private individuals, declaring that, in his opinion, the measure would permit counties to enter competition with private industry. The House killed a bill to require dredge operators to level their tailings.

New Jersey.—A new House bill would make all occupational diseases compensible under the workmen's compensation act where the exposure occurred during the employment and the disability commenced within five months after termination of the exposure.

New York.—A new bill would require that contractors shall file bonds to secure laborers and material men on all public improvements undertaken by public authorities, housing authorities or municipalities.

Ohio.—A favorable committee report was given a House bill to provide specific exemption to clay, limestone and shale from the prohibition against using portable machinery employing gasoline or fuel oil for fuel.

A Senate bill would require that future contracts which involve the removal of minerals by strip mining include specific provisions for the replacement and leveling up of the earth removed, and would require a bond for the performance of such provisions of the contract.

Oklahoma.—A bill to regulate the manufacture, sale and use of explosives was passed by the Senate and sent to the House committee on manufacturing and commerce.

Rhode Island.—No new bills affecting the nonmetallic-minerals industries were introduced, and no changes were made in the status of measures reviewed last month.

Texas.—Two House bills by the same author would place a tax of 1 cent per cubic yard on gravel and rock, and a tax of $1 per ton on fullers' earth.

Washington.—An unfavorable committee report was given a House bill seeking to establish a state cement plant.

The Senate passed and the House advanced toward passage bills to license and regulate the manufacture, sale and possession of explosives; and to require shelters against inclement weather where four or more employees are regularly employed.

Wyoming.—The legislature passed and the governor signed a bill appropriating $20,000 to the state board of health for a study of occupational diseases in the state. A bill seeking a state labor-relations act, patterned after the national Wagner act, was killed.

Prevention, Treatment of Cement Dermatitis

Since Portland cement is a sterile substance, the skin reaction which is occasionally experienced by cement workers is evidently not a poison. This fact is mentioned because the term "cement poisoning" is sometimes carelessly used as descriptive of the condition. There are three possible causes of the trouble:

1. The sandpaper effect of cement particles when allowed to rub skin surfaces.

2. The action of perspiration-cement or water-cement solutions in etching off the protective surface oils, inviting inflammation of the skin surface.

3. Clogging of the pores with hardened perspiration-cement or water-cement solutions, sealing in poisonous excretions of the pores rather than allowing them to escape.

The treatment should be based on two principles: (1) The prevention of extended contact of cement particles with the skin, and (2) inactivation of the alkali. To reduce primary contact with the skin the clothing worn should be as nearly as possible dust-tight, and an ointment should be applied to the exposed skin surfaces. The following formula produces a satisfactory and inexpensive ointment:

¾ pound vaseline
¼ pound lanolin
1 teaspoon powdered boric acid

Melt and mix well. Add a few drops of compound tincture of benzoin. This aids in the mixing process. The powdered boric acid will help keep the mixture sweet.

The hands, arms and face should be washed frequently in order to remove cement or concrete before it has a chance to damage the skin. A complete bath and change of clothing at the end of each shift is important.

Sodium hexametaphosphate (known commercially as Calgon) in a 2-per cent. solution has proved valuable in controlling *soap workers'* dermatitis by inactivating the alkali. Since the skin reaction experienced by soap workers is comparable to that of cement workers, except that the former is more severe, it has been suggested that the same treatment would be effective in preventing skin trouble acquired through contact with cement. Its use is therefore recommended on trial.

In general, preventive measures should be based on the fact that cement is not a poison, and that the true causes of the condition are mechanical and, when the cement is moist, chemical. The wearing of dust-tight clothing, the use of an ointment on exposed skin surfaces, and meticulous cleanliness are important preventive measures.

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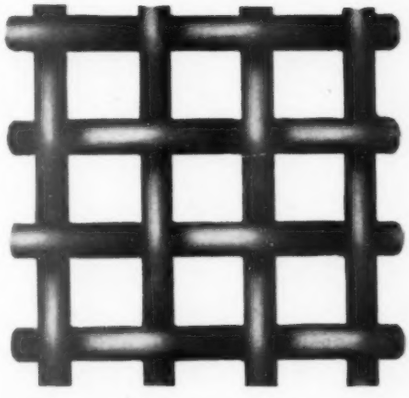

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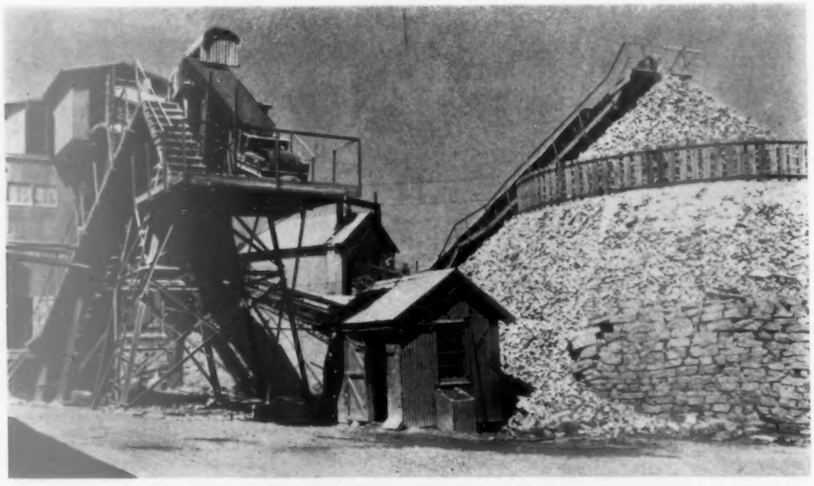
Missouri Dolomite Plant Benefits as Steel Mills Operate at Top Capacity

The fenced raw-rock stock-pile with its feed and reclaiming conveyors and two handling conveyors in the crushing and screening department.

ALONG with most other non-metallic minerals the output of roasted, clinkered, or dead-burned dolomite has gone up rapidly in the last year or two due to improved business conditions. The demand for this product varies with steel-ingot production which has been hovering at record levels in recent months. The bulk of the production of this material is centered near the major iron-and-steel districts with a large proportion of it coming from northwestern Ohio. There are, however, a number of dead-burned-dolomite producers outside this area.

One of these producers is the Valley Dolomite Company, of St. Louis, which has had an interesting history since it went into this business in February, 1928. At that time the company put in operation a new wet-process plant on the property of the Granite City Steel Company at Granite City, Illinois, just across the river from St. Louis. The raw materials used were high-grade dolomite from the Chicago area and chats from the lead mines near Bonne Terre, Missouri, 60 miles south of St. Louis. These materials were blended to obtain the proper finished analysis. The product was marketed under the trade-name of "Gran-Ite."

An exhaustive search was made for a suitable deposit of raw material close to the plant and in 1929 the deposit now being worked at Bonne Terre was discovered and purchased. It contains the necessary fluxes uniformly distributed through it and is said to be the only natural deposit in this country. Its flux analysis is said to be almost identical with that of the best Austrian magnesite. The stone is in strata 40 to 45 feet thick and is badly faulted.



Another view of the raw-rock stock-pile with the fence around the live-storage section and the feed conveyor above. At left in the crushing and screening department.

Truck dumping quarried rock on feeder of primary crusher. Conveyor at left feeds to raw stock-pile.

The Valley Dolomite Corporation purchased all of the property on which they could locate this strata where it was susceptible to economical quarrying.

In 1930 the quarry was opened and a crushing plant was built on this property. The raw stone was shipped to the Granite City plant for calcining and other processing. In 1936 two small rotary kilns and the necessary appurtenant equipment were installed at Bonne Terre and the Granite City plant was used only as a stand-by. In the winter of 1938-39 a third and larger kiln was installed in this plant which now has a daily capacity of 300 tons of clinkered dolomite. Usually the large kiln and one small kiln are in operation, producing about 225 tons daily. The Granite City plant is kept in readiness but will not be operated except in an emergency.

There is nothing unusual about the quarry or its operation. Drilling is

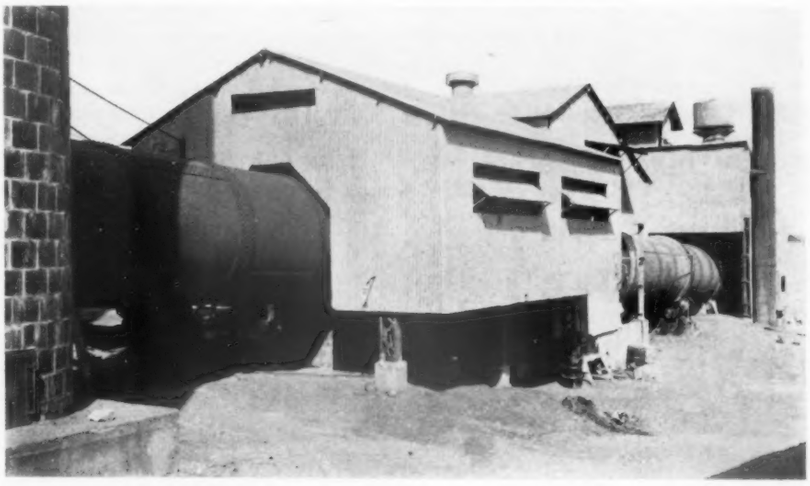
done with a Gardner-Denver wagon-drill and three Gardner-Denver jack-hammers. Air for operating these drills is supplied by a Gardner-Denver compressor in the plant. The quarry is worked in 8- to 16-foot benches and shots are made with Hercules Gelamite fired through fuse. A Lorain 75 crawler shovel with a Caterpillar Diesel engine loads the stone into five Mack Bulldog trucks. These haul 5¾-ton loads a distance of about 1,000 feet to the plant. A Caterpillar D 7 tractor equipped with a bulldozer maintains the roads in the quarry and about the plant and is also used to remove the light overburden and for other work. Another Lorain shovel is used for overburden removal.

The stone is dumped from the trucks on the pan-feeder ahead of the 28- by 36-inch Traylor primary jaw crusher. The minus 3-inch product of this crusher is carried on a 24-inch by 76-foot Barber-Greene belt-conveyor to a raw-material stock-pile with a live-storage capacity of 480 tons. This conveyor, like most of the others in this plant, is equipped with Goodyear conveyor belting.

This pile originally had a live-storage capacity of only 340 tons and was so located that the stone would sometimes roll down on the main road into the plant. A fence, made of vertical wooden pickets, held in place at their tops and bottoms by circular steel bands, was erected at the junction of the "live" and "dead" sections of the storage pile. This fence increased the live-storage capacity 140 tons and prevents any overflow.

Looking down the main conveyor to the crushing and screening department. Raw-rock stock-pile is at right and quarry in background.

Stone is withdrawn from the stock-pile by a 30-inch by 6-foot pan-feeder on a 24-inch by 48-foot Barber-Greene belt-conveyor. On this it travels to a 42- by 36-inch American ACS_2 ring-mill which reduces the stone to minus 1-inch size. A series of three 24-inch Barber-Greene belt-conveyors, 13½, 78 and 59 feet long, feeds the 4- by 14-foot Nordberg Symons 2-deck screen. The plus 1-inch oversize goes into an American hammer-mill. The ½- to 1-inch stone off the bottom deck goes to a set of 42- by 18-inch Traylor rolls. The minus ½-inch stone falling through the bottom deck, with the product of the two crushers, is elevated to a Niagara 2-deck vibrating screen. This screen makes dust and two sizes of crushed stone. The minus 6-mesh dust drops into a 125-ton bin and each size of stone into a 375-ton bin. All the screens are equipped with Ludlow-Saylor wire cloth.

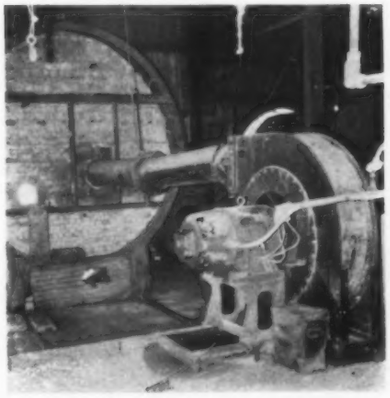


General view of the plant showing one of the three rotary kilns.

The dust is sold as agricultural-limestone or fertilizer filler. It can either be loaded from the bins into trucks or dropped on the main belt-conveyor for loading into railway cars.

The 6-mesh to ½-inch rock is discharged on the 18-inch by 310-foot main belt-conveyor, which has three optional discharges. The stone can be dropped on a 70-foot car-loading conveyor or on a conveyor to the kiln-feed bins, or it can be discharged through a spout on a stock-pile of 6,500-ton capacity. A Sauerman ¾-cubic yard Crescent scraper, operated by an American hoist, is used to distribute the stone in storage and to reclaim it to a bucket-elevator which feeds it back on the main belt-conveyor. When the main belt-conveyor is not operating, the stone can be discharged from the elevator direct on the belt-conveyor to the kiln-feed bin. Some of this sized stone is sold to steel plants as raw dolomite.

The raw-material stock-pile makes the plant and quarry independent of each other and makes possible the operation of all the departments at their maximum capacity. The quarry and primary crusher capacity is about 100 tons per hour, while that of the screening and secondary-crushing department is about 60 tons per hour. The stock-pile makes it possible to operate the quarry and primary crusher at full capacity until the stock-pile is built up



The fan which blows the coal from the direct-firing tube-mill into the kiln.

and then to shut down entirely. The steady feed from the stock-pile to the processing department keeps it operating at maximum capacity. The sized-stone stock-pile prevents delays in shipments or in feeding the kilns.

Stone is withdrawn from the 800-ton kiln-feed bin on individual belt-conveyors which are chain-driven from the three kilns. The two 7½- by 7- by 125-foot kilns are fed direct. The stone for the 9½- by 8½- by 150-foot kiln goes to an elevator and a kiln-feed spout. No iron or other ingredient is added.

Beginning at their discharge ends each of these kilns is lined with 7 feet of 70-per cent. alumina brick followed by 22½ feet of Forsterite or magnesite in their hot zones and 7 feet more of high-alumina brick. Ordinary cold-zone brick is used elsewhere.

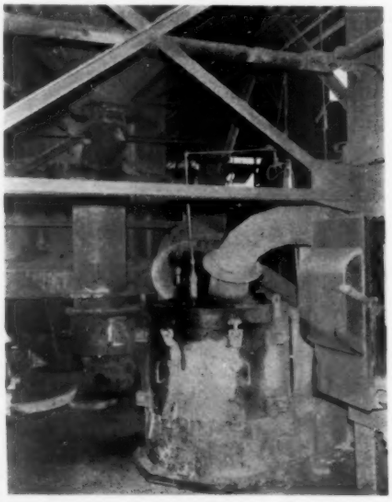
The 150-foot kiln is fired with pulverized coal by a Kennedy-Van Saun direct-firing air-swept tube-mill which has a capacity of 7,200 pounds per hour. This mill is on the cooler floor below the kiln floor on which its fan is located. One of the 125-foot kilns is direct-fired by a 24-inch Babcock & Wilcox mill and the other by an Aero pulverizer, both on the kiln floor. Hot air for these pulverizers is drawn from the coolers. Temperatures of 2,850 to 2,900 degrees F. are maintained in these kilns.

The direct-firing tube-mill which serves the largest of the three kiln.

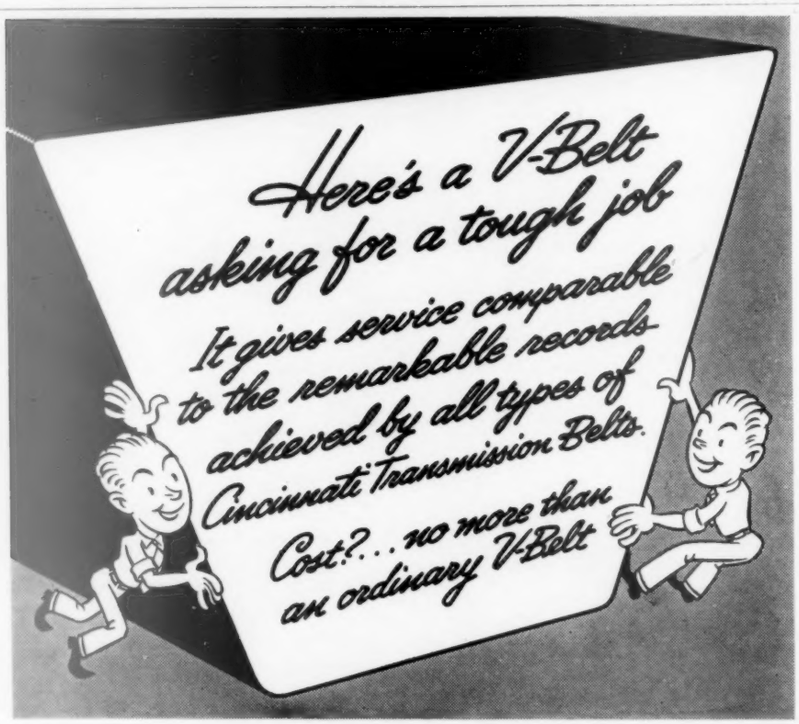
Coal is received in cars and is carried on a belt-conveyor to a concrete stone storage silo. A bucket-elevator feeds the coal to a screw-conveyor which supplies the three kiln-mill feed bins.

The product of the 150-foot kiln drops into a 7- by 65-foot rotary cooler. That from both 125-foot kilns goes to a 6- by 60-foot rotary cooler.

The roasted dolomite from the large cooler is discharged on a 14-inch by 20-foot belt-conveyor followed by a bucket-elevator to which the other cooler discharges direct. The elevator discharges into a 300-ton capacity circular steel bin or a new 400-ton conical bin as desired. A 78-foot belt-conveyor feeds from these bins on the 310-foot main belt-conveyor already described. From the loading belt-conveyor the finished product is loaded either into containers in gondola cars or into box cars.



Direct-firing coal-mill on one of the two small kilns.



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PERSONAL MENTION

M. L. Silcox, chief chemist for the Pennsylvania-Dixie Cement Corporation at Des Moines for the last two years, has been transferred to the corporation's plant at Nazareth, Pennsylvania, where he will serve as superintendent.

Clifford W. Siniff, who resigned recently as a member of the Indiana State Highway Commission, has been named special representative of the American Aggregates Corporation of Greenville, Ohio, and will serve that organization in Indiana, Michigan and Ohio.

Col. Horatio B. Hackett has been elected president of the Material Service Corporation, Chicago, succeeding Henry Crown, who was made chairman of the board. Mr. Hackett recently resigned as president and director of Thompson-Starrett Company, Inc., nationally-known construction firm.

V. P. Ahearn has been made secretary of the board of trustees of The Air Hygiene Foundation.

Lloyd Calkins has sold the business of the Oceanlake Sand & Gravel Company, Ocean Lake, Oregon, to Lyle Hasselbrink and John C. Lowe.

A. A. Dahms has been made manager of the Davenport, Iowa, branch office of Allis-Chalmers Manufacturing Company.

John L. A. Galster was re-elected president and treasurer at the Petoskey Portland Cement Company at a recent annual meeting. George W. John was named vice-president and general manager with Homer Sly, J. C. Buckbee and H. H. Lucas named as vice-presidents. E. O. Nyman was again elected secretary.

William E. Wright has been made sales engineer by the Diamond Iron Works, Inc. He was formerly associated with the Austin-Western Company and for the last three years has conducted an equipment business in Wisconsin.

D. G. Savage, sales manager of the Thew Shovel Company, has been promoted to general sales manager. Other changes include the elevation of M. B. Garber to assistant sales manager and the appointment of J. L. Beltz as manager of sales promotion.

Francis E. Finch, formerly president of Ruggles-Coles Engineering Company and later vice-president of the Hardinge Company, Inc., is now sales-manager for Centrifugal & Mechanical Industries, Inc., of St. Louis, maker of continuous centrifugal driers.

H. C. Maginn has been elected vice-president of the Calaveras Cement Company and will be in charge of the sales and traffic departments. He has been with the company since it was started in 1926. He is a director of the Associated General Contractors of America.

Ernest C. Low has been appointed general manager of sales of the John A. Roebling's Sons Company. He has been identified with the Roebling organization for 32 years.

E. H. Mathieson has leased the plant of the Brown Sand & Gravel Company, in Sunnyside, Washington.

James M. White, who has been manager of the La Porte, Indiana works of the Allis-Chalmers Manufacturing Company since 1935, has been made assistant general works manager.

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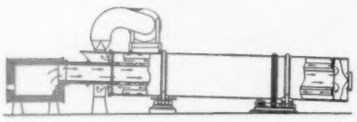

XA DRYER
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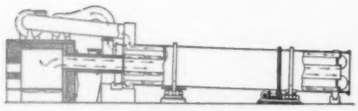
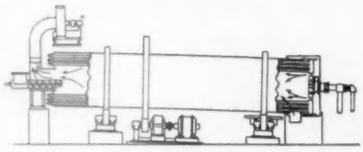
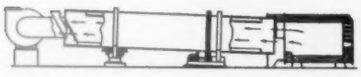


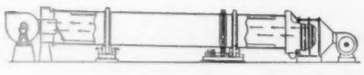
XB DRYER
Double Shell Indirect Heat



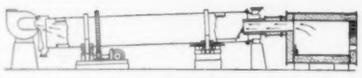
C DRYER
Rotary Steam Tube Dryer



XF DRYER
Single Shell Direct Heat



XH DRYER
Counter Flow Dryer



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J. C. Merwin

J. C. Merwin, vice-president and treasurer, has been elected president of the Chain Belt Company to succeed C. R. Messinger who died February 4. Mr. Merwin joined the Chain Belt organization in 1917 and has been successively superintendent, works manager, assistant to president, director, vice-president and treasurer. He is a graduate of Sheffield Scientific School of Yale University, class of 1910, and began his business career as an apprentice tool maker.

Mrs. M. K. Lounsbury, treasurer of the Allwood Lime Company, Manitowoc, Wisconsin, died suddenly on February 27. She had been active in the affairs of the National Lime Association for several years as director of District 8.

Tom B. Laird, 59, head of the Washed Sand & Gravel Company and the Laird Stone Company of Jonesboro, Arkansas, died recently following a heart attack. He had been in rather poor health since he was injured in an automobile accident during the Christmas holidays.

J. M. Meffert passed away at the age of 84 at his home in Lowell, Florida, on February 18. Mr. Meffert started in the lime business in the early nineties at Lowell, 11 miles north of Ocala, when he acquired the property of the old Ocala Lime Works, the first plant to operate in the state. He continued to operate as the Florida Lime Company until his retirement from business about 10 years ago. W. H. Meffert, son of J. M. Meffert, has been an active operator in the lime business since the retirement of his father, doing business as Florida Lime Products Company, Inc., at Ocala.

J. E. Pennybacker, managing director of the Asphalt Institute, and managing head of its predecessor, The Asphalt Association since 1919, died February 25, at Delray Beach, Florida, where he had gone to try to regain his health.

Ernest P. Williams, 67, former district sales manager for the Alpha Portland Cement Company at Easton, Pennsylvania, died March 5 of a paralytic stroke in a Washington hotel. He was retired on a pension by the cement company in 1938.

Nels Nicholson, 88, president of the Crisman Sand Company, Crisman, Indiana, died recently after a long illness. He was a native of Sweden and came to this country at the age of 16.

Jerre R. Massey, works manager of the National Gypsum Company's plant at Mobile, Alabama, died recently. He was 50 years old. Formerly he was manager of the Greenville, Mississippi, operations of the United States Gypsum Company.

Ollie C. Davis, 62, owner and operator of the Rockmart Slate Mines, was killed instantly by a falling rock which had been loosened by a blast at one of his quarries near Rockmart, Georgia, recently.

Robert H. Radcliff, 57, died suddenly following a heart attack at his residence at Celeste, Alabama, recently. He was president and owner of The Radcliff Sand & Gravel Company.

TRAFFIC News Digest

I.C.C. Decisions

Stone and Gravel—Fourth-section application No. 18277, stone, slag and gravel to Michigan. The applicants authorized by fourth section order No. 14095 to establish and maintain, over their circuitous routes, on crushed stone, slag or gravel, coated with oil, tar or asphaltum, in carloads, from Chicago, Illinois, and points in the Chicago switching district and from intermediate points from which rates from the named points are observed as maxima, to destinations in the lower peninsula of Michigan, the lowest rate that may be constructed over any line or route from and to the same points on the basis of the distance scale of rates and in the manner described in the report and to maintain higher rates to intermediate points. The rates to the higher-rated intermediate points, for distances not exceeding those for which rates are provided in Appendix C of the report, are not to exceed rates constructed on the same basis and in the same manner as rates to the more distant points, and rates for greater distances are not to exceed rates based on the aforesaid scale, extended at the same rate of progression as the rates in the scale for distances above 300 miles. The relief granted is not to apply (1) where the distance over

the short tariff line or route is 150 miles or less and the longer line or route is more than 70 per cent. circuitous, and (2) where the distance over the short tariff line or route exceeds 150 miles and the longer line or route is more than 50 per cent. circuitous, except that where the distance over the short-tariff line or route does not exceed 255 miles, relief will apply to such longer line or route though it be more than 50 per cent.

Industrial Sand—The commission, with Commissioner Johnson dissenting, in a report written by Commissioner Porter in No. 28150, industrial sand within western Pennsylvania, has found intrastate rates on industrial sand in open-top cars from Polk and Utica, Pennsylvania, to destinations in western Pennsylvania unjustly discriminatory against interstate commerce. The federal body has left the matter of adjusting the intrastate rates to conform with its findings to the railroads and the Pennsylvania commission, in accordance with the commission's practice in such intrastate rate cases. It was said by the commission that if that was not accomplished within six days from the service of the report, consideration would be given to the entry of an appropriate order.

This proceeding was initiated on the petition of the Pennsylvania, Baltimore & Ohio, and certain of their affiliated short-line connections. All common carriers by railroad in Pennsylvania were made respondents. Polk, one of the origin points, is located on a branch line of the New York Central, and Utica is on a branch line of the Erie between Meadeville and Oil City, Pennsylvania. The state rates were less than the intrastate rates on industrial sand in official territory. The interstate rates, with a few exceptions, were on a basis prescribed July 1, 1935, in Industrial Sand Cases, 1930, 188 I.C.C. 99 and 204 I.C.C. 159.

It was found by the commission that industrial sand in open-top cars in joint-line from Polk and Utica to destinations in western Pennsylvania for distances of 200 miles and less was not contributing its fair and just proportion to the revenues of the respondents, and by reason of that fact the railroads were suffering substantial losses in revenue to which they were entitled, and that an increase in rates on the intrastate traffic to the bases prescribed herein would not be above a reasonable level. It further found that the interstate rates based on the so-called West Penn joint-line scale with reasonable groupings, eastbound from Ohio into western Pennsylvania and between western Pennsylvania and the other adjoining states prescribed on like traffic, as increased 10 per cent. under the general increase of 1938, were just and reasonable rates.

Commissioner Johnson, in his dissent, said that the loss of revenue caused by the maintenance of lower intrastate rates than interstate was too trivial to warrant the commission's exercise of its power under Section 13 of the Interstate Commerce Act.

Polished Granite—I. and S. M-1400, polished granite from Kansas City to Chicago. Heard by Examiner P. H. Dawson. The proposal of Wheelock Brothers, Inc., a motor common carrier, and Midwestern Motor Freight Tariff Bureau, Inc., to establish a local and joint commodity rate of 30 cents, minimum 18,000 pounds, from Kansas City, Missouri, and other near points, to Chicago, Illinois, found unlawful. Suspended schedules proposed to be ordered cancelled and the proceeding discontinued. The examiner observed the respondents' present rate was 35 cents on a minimum of 16,000 pounds. The report said J. P. Gilman Granite Company, a wholesaler of polished granite at Kansas City, supported the proposed rate on the ground it was necessary to meet certain competition at Minneapolis, Minnesota, and other points. The examiner said that earnings under the proposed rate and minimum were exceedingly low.

Stone—The commission, by division 2, has instituted on its own motion an investigation in MC C-250 into the reasonableness and lawfulness of rates, etc., on stone from eleven points in Georgia to points in New England, trunk-line and central territories and has assigned the matter for hearing on March 24 in Atlanta, Georgia, before Examiner Richard Yardley.

According to the commission order by which it was instituted the proceeding will deal with the rates and charges, and the rules, regulations and practices affecting such rates and charges, applicable to the transportation in the interstate or foreign commerce of stone as described in tariff MF-I.C.C. 181 of Southern Motor Carriers' Rate Conference, agent, from Ball Ground, Berkeley, Canton, Elberton, Ethridge, Granite Spur, Lithonia, Marietta, Oglesby, Stone Mountain and Tate, Georgia, to all points of destination named in that tariff, maintained by parties to it and by parties to tariffs of Agent R. S. Cooper.

Fourth-Section Applications

Docket No. 18921—Filed by L. E. Kipp requesting fourth-section relief to establish rates on hydraulic lime and

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dry building mortar, in carloads, from Brillion, Eden, High Cliff, Knowles, and Sherwood, Wisconsin, and Menominee, Michigan, to points in Wisconsin and Michigan to meet carrier competition and to apply over short tariff routes. Rates constructed on the basis of the short-line distance formula. Schedules filed containing proposed rates are L. E. Kipp I.C.C. A-2984 Supplement 21, C.&N.W. I.C.C. 10924, C.M.St.P. &P. I.C.C. B-7288, and M.St.P.&S.S.M. I.C.C. 6955.

Docket No. 18944—Filed by W. S. Curlett requesting fourth-section relief to establish rates on ground or pulverized limestone and stone dust, in carloads, from Ogdensburg, New Jersey, to points in trunk line, central, and New England territories to meet carrier competition.

Central Freight Association

Docket 65506 (Carrier's proposal)—Gravel and sand, in straight or mixed carloads, minimum weight 90 per cent. of the marked capacity of the car (subject to Note 30, page 22 of P.M. R.R. Tariff 6206-Q). Establish on, from Lamar, Wyoming and Ferrysburg, Michigan to Kingsbury, Indiana, $1.34 per net ton, *via* P.M.R.R., Wellsboro, Indiana, and B.&O. R.R. Note: When shipments are not weighed upon track scales, the estimated weight will be 2,700 pounds per cubic yard on sand, and 3,000 pounds per cubic yard on gravel, and 3,000 pounds per cubic yard on mixed carloads of gravel and sand.

Docket 66005 (Carrier's proposal)—Gravel, in closed equipment, carloads. Addition of, to Description A, in Item 200, page 16, CFAL Tariff 575-A, publishing rates on industrial sand, carloads, from Jackson, Ohio, to points in T.L.A. and N.E.F.A. territories. Applicable only from Jackson, Ohio in connection with rates named in Items 210 to 294, inclusive.

Docket 66007 (Carrier's proposal)—Dolomite, roasted (refractory dolomite, in granular form, treated or untreated, clinkered or burned to a dead state), carloads, minimum weight 90 per cent. of the marked capacity of the car, except that when cars are loaded to their full cubical or visible capacity, actual weight will apply. Establish on shipments from Durbin, Ohio, to Glen Ferris, West Virginia, $2.14 per net ton.

Docket 66049 (Shipper's proposal)—Sand and gravel, in open-top cars, carloads. Establish on shipments from Navarre to North Lima, Ohio, 99 cents per net ton, *via* W.&L.E.-Canton, O.-P. R.R.—Columbiana, O.-Y.&S.

Docket 66050 (Carrier's proposal)—Industrial sand, as per usual descriptions. Establish on shipments from M.&S. Valleys Group points, *viz.*: Geauga Lake, Mahoning, Phalanx, Burnetts, Ohlton, Ohio, and Edenburg, Volant, Schollard, Leesburg, Greenville, Osgood and Henlein, Pennsylvania, to Glen Morgan, West Virginia, (a) $3.19, (b) $3.51, (c) $3.19 per net ton.

LABOR DECISIONS

Guaranteed Wage

Mary Lincoln Candies, Inc., et al. v. Department of Labor of the State of New York et al., decided by the New York Supreme Court, Erie County, November 26, 1940; reported at 175 Misc. 399.

This case arose under Section 111 of the New York State Labor Law, the plaintiffs seeking to have an order of the State Labor Department fixing minimum wages in the confectionery industry adjudged invalid and unreasonable. The court found that under the order as drawn "the employers in said industry will not be able to match the various specified periods of employment with gainful work. The character of the industry will necessarily make such an accomplishment infrequent. In the light of this fact, known alike to the Industrial Commissioner and the Confectionery Wage Board, it may be seen that the . . . order contemplates and will require payment of compensation when there is no work done or to be done. This is unreasonable; there is no authorization for it in the statute; it goes beyond the holding in *West Coast Hotel Company v. Parrish*" (300 U. S. 379). In place of the offending guaranteed-wage provisions, the court suggests an increase in the hourly minimum for instances of short-term employment, "an incentive would have been given to employers to strive for an arrangement of work to afford as much full-time employment as possible. Such is the avowed purpose of the 'guaranteed-wage' provisions." The order is referred to the Board of Standards and Appeals with suggestions for such an amendment, by authority of Section 110 of the Labor Law.

Interstate Commerce

National Labor Relations Board v. Central Missouri Telephone Company, decided by the U. S. Circuit Court of Appeals, Eighth Circuit, November 27, 1940; reported at 115 Fed. (2d) 563.

This case involved a company operating a number of local telephone exchanges in the state of Missouri, which are connected with each other and with

the facilities of the Bell system. Although the revenue from interstate messages over the company's lines is but a small portion of the gross operating revenue, the company is held to be subject to the jurisdiction of the National Labor Relations Board. It was also claimed that a strike induced by unfair labor practices of the company would not have an instantaneous effect on interstate commerce; but the court rules that "it is enough that a showing is made that respondent's unfair labor practices may lead to strikes which threaten to obstruct [interstate] commerce."

Espionage

Montgomery Ward & Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Eighth Circuit, December 2, 1940; reported at 115 Fed. (2d) 700.

The court in this decision assumes, without deciding, that proof of the maintenance by an employer of a system of espionage, one of the purposes of which is to secure information relative to the attitude of his employees toward self-organization, joining a union, and kindred matters, is not alone sufficient to justify a finding that the employer has committed an unfair labor practice in violation of Section 8(1) of the National Labor Relations Act. However, the finding of the board that the employer concerned did commit an unfair labor practice, and a cease-and-desist order based on that finding, are held to be justified by the evidence produced in the case, and the order is affirmed.

The court further holds that the suggestion that the order of the board will prevent the company from using its system of espionage for the purpose of detecting thefts and irregularities of its employees "is clearly without merit". The order of the board merely prevents the company from using the system for the purpose of interfering with, restraining or coercing its employees in respect to the rights of self-organization guaranteed by Section 7 of the National Labor Relations Act.

Bargaining

Wilson & Company, Inc. v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Eighth Circuit, December 2, 1940; reported at 115 Fed. (2d) 759.

In this case, the court holds that the evidence supports the findings of the National Labor Relations Board on which the board founded an order requiring the petitioning company to cease and desist from refusing to bargain collectively with a certain union of its employees, and to take appropriate affirmative action. In its decision the court summarizes the applicable rules of law, based on the accumulated decisions under the National Labor Relations Act, as follows:

While the act does not compel that employer and employees shall agree, it contemplates that agreements will be reached as the result of collective bargaining. It obligates the employer to bargain in good faith both collectively and exclusively with the chosen representatives of majority of his employees with respect to all matters which affect his employees as a class, including wages, hours of employment, and working conditions. It does not, however, prohibit individual employees or groups of employees from negotiating with the employer concerning grievances. The employer is not required to take the initiative in seeking a contract with his employees or with their chosen representative, nor is he required to enter into negotiations with third parties not representing his employees.

When an employer has reached an agreement with his employees, he is under the further duty of bargaining collectively before making changes in existing contracts. The requirements which are imposed by the act upon the employer can only be satisfied by an honest and sincere compliance. When collective bargaining results in agreement, a good-faith compliance with the law requires that the agreement be reduced to writing, unless both parties desire that it remain oral, or unless some other justifiable ground exists for not putting it in writing.

Labor Spy

Ohio Power Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Sixth Circuit, December 4, 1940; reported at 115 Fed. (2d) 839.

The only controversial feature of this case was whether the employer involved hired a "labor spy" and was therefore guilty of labor espionage in violation of Section 8(1) of the National Labor Relations Act. The employee concerned was a former detective, and this, says the court, "may arouse a suspicion of the nature of that employment." However, "to sustain a finding that petitioner employed a labor spy, the evidence must amount to more than mere suspicion and conjecture." There was no evidence that the company hired the former detective to do undercover work or authorized him to do such work, and the board's order is modified by striking out the paragraph concerning espionage.

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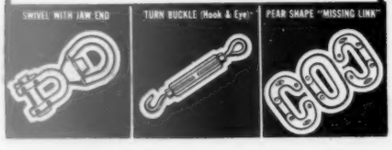

Discharges

Martel Mills Corporation v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Fourth Circuit, September 6, 1940; reported at 114 Fed. (2d) 624.

The National Labor Relations Board found that the employer concerned in this case discriminated in regard to hire and tenure of employment of certain employees, thereby discouraging membership in a union, an unfair labor practice forbidden by the National Labor Relations Act. The court, upon a review of the evidence, holds that there is no substantial evidence supporting that finding, and that the discharges were not due to union membership or union activities.

"Under a system of free enterprise, amended by a statute which seeks to attain an equality of contract and of justice through the protection of the employees' right to bargain collectively, we must not destroy those liberties which are distinctive to our type of economy," says the court. "The employer must be permitted to discharge the inefficient, the irresponsible, the disobedient, the immoral. 'The petitioner is at liberty, whenever occasion may arise, to exercise its undoubted right to sever his relationship for any cause that seems to it proper save only as a punishment for, or discouragement of, such activities as the act declares permissible.' The mere existence of union affiliations, though these affiliations be material in nature, does not leave the employee free from the consequences of his indiscretions and failings. Where economic considerations necessitate a contraction in the employer's labor force, the employer, in deciding which employees must be retained, must be be free to choose from the more capable and more worthy. It would be an abuse of the terminology of the act if an employer were obliged to discriminate in favor of union men as against non-union men through fear of action by the board and the courts."

Injunction

Fleming v. Tidewater Optical Company, Inc., decided by the U. S. District Court, Eastern District of Virginia, Norfolk Division, October 11, 1940; reported at 35 Fed. Supp. 1015.

The court notes that the evidence in this case shows extensive violations of the Fair Labor Standards Act by failure to pay minimum wages, failure to pay time and a half for overtime and failure to keep proper records. Under all the circumstances, "considering the continuous and numerous violations that extended over a period of approximately sixteen months, with knowledge on the part of the defendant of the general provisions of the act, and the failure to make any effort to determine the correct amounts due employees for back wages," the court holds that an injunction should be granted to restrain violations of the act, even though the violations complained of had ceased before the case was heard.

Parties

Townsend et al. v. Boston & Maine Railroad and *Same v. Palmer et al.,* decided by the U. S. District Court, District of Massachusetts, December 2, 1940; reported at 35 Fed. Supp. 938.

In this decision, made on various motions in two suits under the Fair Labor Standards Act, the court rules that the Federal court has jurisdiction because the suits arise under laws regulating commerce, and that it is not necessary that the amount of $3,000 be involved. The defendants sought to have the suit dismissed because not all the employees concerned had authorized the institution of the suits. The court holds, however, that it is not essential that an agent, bringing an action, should receive authority from every person for whose benefit he brings the action, it being sufficient if he was authorized by one employee either to bring the action for that employee or for that employee and all others who were similarly situated and to be benefited thereby.

Competing Union

United Electrical Radio & Machine Workers of America v. International Brotherhood of Electrical Workers, et al., decided by the U. S. Circuit Court of Appeals, Second Circuit, November 4, 1940; reported at 115 Fed. (2d) 488.

This was a suit for injunction and for damages brought by a union of men engaged in producing electrical equipment against a union of men engaged in installing such equipment, two locals of the latter, and a manufacturer of electrical equipment. It was claimed that the defendants conspired to deprive the plaintiff union of the right of collective bargaining guaranteed it by the National Labor Relations Act, by efforts to wean members away and to boycott the products of a manufacturer dealing with the plaintiff union.

The court upholds the decision of the U. S. District Court that the plaintiff has no right to the remedy sought. The part allegedly played by the equipment maufacturer was an "unfair labor practice" under the act, so that the procedure provided for before the National Labor Relations Board is the exclusive remedy. While the question concerning the defendant unions is not so clear, the court holds that the remedy of injunction and damages sought through the courts would interfere

with the board's power to pass on elections to determine bargaining agents.

The court does not hold that the plaintiff union has no recourse to any court for the loss of its members; but if it has, it must be based upon a violation of the law of a state.

Investigation

National Labor Relations Board v. Barrett Company et al., decided by the U. S. District Court, Southern District of Illinois, Northern Division, October 3, 1940, amended November 7, 1940; reported at 35 Fed. Supp. 588.

After the filing with it of a charge that the company involved in this case was engaged in unfair labor practices the National Labor Relations Board instituted an investigation to determine, before proceeding farther, whether the company was engaged in interstate commerce and hence subject to the National Labor Relations Act. When the company refused to permit the board's agents to examine its books and records, the board issued a subpoena directing the production of data bearing on the question. The company opposed the subpoena on the ground that the board had no authority to issue subpoenas or compel testimony except at a hearing duly called and held after the issuance of a complaint. The court, however, rules that the issuance of the subpoena is authorized by the act; that it does not permit the unlimited power of inquisition or an unlimited right of access to accounts and books of the company, but asks only for books and exhibits for a determination which is a fundamental necessity in any hearing upon complaint before the board. An order requiring obedience to the subpoena was issued by the court.

Records

Fleming v. G & C Novelty Shoppe, Inc., decided by the U. S. District Court, Northern District of Illinois, Eastern Division, November 12, 1940; reported at 35 Fed. Supp. 829.

This was an application of the Administrator of the Wage and Hour Division of the U. S. Department of Labor for an order to compel the respondent to attend, testify and produce certain documentary evidence in accordance with a subpoena. The respondent contended that it was not engaged in interstate commerce or in the production of goods for interstate commerce and that therefore the Administrator has no right to investigate its books and records.

The court holds that if (as here) the Wage and Hour Division comes into court and makes a showing in its application that some activity engaged in by the respondent or some opera-

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tion brings it within the purview of the Wage and Hour Law, the Administrator is justified in going in and looking at the records; otherwise there would be no way to investigate whether such employers are violating the act. The order is therefore granted.

Supervisory Employees

Magnolia Petroleum Company v. National Labor Relations Board and *Magnolia Production and Shop Department Employees' Association v. Same,* decided by the U. S. Circuit Court of Appeals, Tenth Circuit, November 18, 1940; reported at 115 Fed. (2d) 1007.

The National Labor Relations Board concluded that the association named in this suit was an outgrowth of an earlier employee-representation plan which was "clearly inconsistent with the effectual purposes" of the National Labor Relations Act, and that there was evident hostility to an outside union by certain supervisory employees. Its order requiring the employer to withdraw recognition from the association is affirmed in this review by the court, mainly on the principle that the board is the proper judge of the conclusions to be drawn from the evidence. The company's declaration of policy was not contrary to the act, but "it is apparent from the record that the subtle hand of certain supervisory employees exercised an unwarranted influence in the formation of the association inconsistent with the neutrality made mandatory by the act."

The fact that the board supervised elections in two of the company's districts in which the association was one of the unions participating does not, it is held, prevent the board from denying the validity of the association, particularly since those districts were excepted from the scope of the order involved in this review.

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A.S.T.M. Standards

To keep up to date its triennially published Book of Standards, the American Society for Testing Materials in the two intervening years issues Supplements to each part of the book. The 1940 Supplement, recently issued in three parts, gives in their latest approved form 292 specifications, tests, and definitions which were either issued for the first time in 1940 or revised.

Part I on Metals, with 100 standards, covers some 500 pages. Part II includes 91 standards and comprises 350 pages covering the nonmetallic materials used for constructional purposes. Specifications and tests cover cement, gypsum, refractories, glass, concrete and concrete aggregates, etc. Part III, the largest volume, covers coal and coke, petroleum products and lubricants, electrical insulating materials, plastics, rubber products, etc.

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OCCUPATIONAL DISEASES and the LAW

Injury

Lumbermen's Mut. Casualty Company et al. v. Lynch, decided by the Court of Appeals of Georgia, Division No. 2, November 14, 1940; reported at 11 S.E. (2d) 699.

An occupational or industrial disease is not compensable under the Georgia Workmen's Compensation Act (*Covington v. Berkeley Granite Corporation,* 182 Ga. 235, 184 S.E. 871). "Such a disease is one caused by, or especially incident to, a particular employment. It is a diseased condition arising gradually from the character of the work in which the employee is engaged, that is, a disease acquired in the usual and ordinary course of an employment which from common experience is recognized to be incidental thereto. It has been said to be the natural and reasonably-to-be-expected results of a workman following a certain occupation for a considerable period of time."

In this case the Georgia Industrial Board denied compensation to an electric welder who was temporarily disabled by oedema of the lungs resulting from the inhalation of fumes. The court, however, reviewing the principles concerning occupational diseases, as stated above, holds that under the facts of this case the worker did not have an occupational disease. The disease resulted not from long exposure to fumes as a normal consequence of the employment, but from on a certain day's work in a manhole. This, says the court, is a disability resulting from an injury by accident, compensable under the Georgia Workmen's Compensation Act.

Failure to Warn

Middlebrooks v. Atlanta Metallic Casket Company, decided by the Court of Appeals of Georgia, Division No. 2, November 16, 1940; reported at 11 S.E. (2d) 682.

The plaintiff in this case sued for damages allegedly due to inhaling lead particles and dust, alleging that the employer did not warn him of the dangers of lead poisoning and did not provide any protective device. The trial court sustained a general demurrer and dismissed the petition. The Ap-

pellate court holds that such action was in error, and reverses the trial court.

"A master must use reasonable care and diligence to provide a safe place for his servant to perform the work for which he employs him," says the appellate court. "Therefore a master should make reasonable provision for his protection against dangers to which he is necessarily exposed while performing such work. And where the services required by the master of his servant are of a peculiarly dangerous character, it is the duty of the master to make reasonably adequate provisions to protect him from the dangers to which he is exposed in performing such services. . . . An ordinary employee or servant does not by virtue of his employment assume the risk incident and peculiar to such employment arising from latent dangers in connection therewith of which he has no knowledge. It is only where a danger is obvious and the work is attended with a manifest risk, which is as easily known to the servant as to the master, that the latter will not be held liable on account of his failure to warn the servant."

Equipment

Holliston Mills of Tennessee v. McGuffin, decided by the Supreme Court of Tennessee, November 23, 1940; reported at 145 S. W. (2d) 1.

This was an appeal from a judgment for injuries based on the employer's alleged violation of Sections 5338, 5339 and 5340 of the Tennessee Code, which were originally Sections 8, 9 and 10 of the "workshop and factory statutes," Chapter 110, Public Acts of 1919. The specific violation charged was the failure of the employer to install and maintain such ventilation machinery, such as fans, blowers, etc., as would protect its employees from the injurious effects of poisonous fumes and gases generated in the course of the operations of the plant, as a consequence of which the workman involved suffered injuries to his throat and lungs. The judgment is affirmed in this appeal.

The court holds that there is properly a distinction between a common-law count charging want of due care in the same particulars (such a count was taken from the consideration of the jury by the trial judge) and the statutory count on which the judgment was founded, because "it appears to be a recognized general rule that the defense of assumption of risk is not permissible where a statute has been violated." In this case "there is abundant evidence that the plaintiff did not appreciate the danger, although he soon became aware of great inconvenience."

A further ruling of the court sustains the constitutionality of Sections 5339 and 5340, which were claimed to be invalid because their provisions were vague and indefinite and because their provisions delegated legislative power. The court is of the opinion that a reading of the sections challenged for indefiniteness "would enable any employer desiring in good faith to comply therewith to do so without serious difficulty. He should be able to ascertain when injurious fumes, gases, etc., are being created and it should be possible for him to so ventilate as to render these fumes, etc., relatively harmless."

Silicosis

Habera v. Polaris Mining Company et al., decided by the Supreme Court of Idaho, December 10, 1940, reported at 108 Pac. (2d) 297; *McLean v. Hecla Mining Company,* decided by the Supreme Court of Idaho, December 10, 1940, reported at 108 Pac. (2d) 299.

In each of these cases a miner sought to recover compensation under the Idaho Occupational Disease Compensation Law (Chapter 161, Session Laws of 1939) for silicosis. In each case the employee had been hired subject to the taking of a physical examination and had been discharged—in one case, after working 20 days, in the other case after working 45 days—when the examination revealed that the employee had silicosis. The compensation sought was denied in both cases because the law specifically provides that liability shall not be imposed upon the last employer until the employee has been exposed to at least 60 days' hazard of dust of silicon dioxide (Section 43-2104, subsection 11).

In the *McLean* case it was argued that the section on which the claim was based (Section 43-2122) was unconstitutional because it is "indefinite, ambiguous, uncertain and unintelligible." The court does not find it necessary to decide that issue, but recommends that the legislature give careful attention to the provisions of the Occupational Disease Compensation Law, and particularly that portion having to do with silicosis, "to the end that its provisions be clarified."

Contributory Negligence

Steiner et al. v. Spencer, decided by the Court of Appeals of Tennessee Middle Section, May 11, 1940, certiorari denied by the Supreme Court of Tennessee, December 14, 1940; reported at 145 S.W. (2d) 547.

The plaintiff (appellee) in this case sued to recover damages for injuries arising from an occupational industrial disease—lead poisoning—contracted as a result of the employer's negligence. Under a count of common-law negligence the jury rendered a verdict for the defendant employer, but under a

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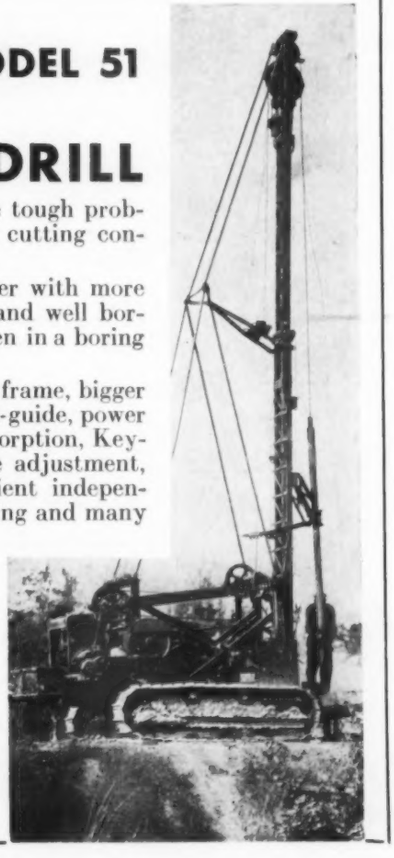
Beaver Falls, Pa.



count based on the alleged failure of the employer to comply with Section 5340 of the Tennessee Code the jury rendered a verdict for the employee. That section is a section of the Tennessee Workshop and Inspection Act which requires that every factory, where the work carried on produces dust, etc., shall be equipped with exhaust fans, pipes, hoods, etc., to remove such dust.

The defendant employer insisted that the plaintiff employee was guilty of contributory negligence in refusing to wear a respirator, in smoking while at work, and in being careless about washing the lead dust from his body on leaving the shop. The judge in the trial court charged the jury that if they found that the plaintiff was guilty of contributory negligence, this fact must be considered by them and a proper deduction made from the amount of damages they would otherwise allow. The defendant insisted that this was error; that contributory negligence is a complete defense to the suit. This contention is sustained by the appeals court. The Tennessee courts had previously held that notwithstanding the employer's noncompliance with the statute he may yet defend by showing that the employee was himself negligent in such a way as to have contributed to the occurrence. "The trial judge," says the court, "should have charged the jury that if they found that the plaintiff was guilty of contributory negligence, which was the proximate cause of the injury, the plaintiff could not recover; provided, of course, that he was properly warned and appreciated the dangerous condition of the work."

The judgment of the lower court is therefore reversed and the case is remanded to the circuit court for a new trial.

Simplicity Gyrating Screens were built as shown above in 1922. Since then, many thousands have been built for every screening operation. This background of experience combined with progressive engineering has kept the Simplicity Screens firmly at the top. We offer proven screening results for your consideration.

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FOREIGN PRACTICE

Sands for Glass-Making

H. Wittenhaus describes the deposits, characteristics, preparation and standards of glass-making sands. Silicic acid required in the making of glass is applied mostly in the form of high-grade quartz sand, and occasionally lump quartz and flint are used. More or less content of alkali or alumina gives each sand a special significance, as, for example, feldspar or kaolin sand. Normal crystal quartz sand consists of at least 99.9 per cent. silicic acid and reaches as much as 99.92 per cent. in the prepared condition. The presence or absence of iron oxide is significant as to the kind of glass to be made. Uniform granular size is essential. Proper and adequate washing of the quartz sand is important.

One of the most important and serious objections in glass sand is iron, which may be present as iron oxide, iron silicate, or metallic iron. The customary maximum limit values of iron in glass sand are as follows:

Use of Sand for	Upper Limit Value for Iron (Fe_2O_3), Which Must Not Be Exceeded
Optical glass	0.02%
Crystal glass	0.03%
General apparatus glass	0.04%
Plate glass	0.10%
Window glass	0.30%
White hollow glass	0.30%
Pane glass	0.50%
Preserving glass	0.50%

—*Steinbruch und Sandgrube,* vol. 39 (1940), no. 20, pp. 279-281; no. 21, pp. 295-297; no. 22, pp. 309-310.

Sands used in ceramic and smelting operations to diminish plasticity in the paste and slip should be tested for purity, granular size, and granule combination. Sand for ceramic uses is often preferred to be free of iron, as, for example, for the refractory industry and for the making of light-colored bodies and glazes. For many purposes, however, an iron-oxide content of less than 0.1 per cent. is regarded as practically free of iron, but for white body and especially for light-colored glazes and glasses the requirements are considerably greater.

For smelting purposes in optical applications the upper limiting value is less than 0.02 per cent. iron oxide, for crystal glass less than 0.03 per cent., for apparatus glass a maximum of 0.04 per cent., for plate glass less than 0.1 per cent., window glass below 0.3 per cent., preserving glasses less than 0.5 per cent. Sands with 0.01 per cent. Fe_2O_3 are regarded for these purposes as practically free of iron. Quartz sand granulation of 0.1 to 0.2 mm. is the most desired for glass sand. Coarser sands are difficult to fuse and result easily in sandy and rocky glass. Too small granules fuse through too easily, thereby causing foaming and finally a tough batch which makes it impossible for the gas to escape, so that the glass will not become bubble-free.

Grinding sand should consist of granules of uniform hardness, firm and tough. Only pure quartz sands can be used, their usefulness increasing with the quartz content. To obtain the maximum grinding effect there should be neither oversize nor undersize granules

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Stands rough treatment and remains accurate, because it operates on the compensating balance belt principle.

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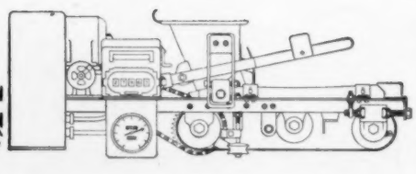

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in essential quantities within one grade of grinding sand. To guard against deficient grinding the content of binding agents should not exceed 5 per cent. Sand having oversized granules is undesirable because the coarse stone causes grooves.

Blower gravel and blower sand should also consist of tough quartz to insure repeated use. Blower or blasting sand consists of gradations 0.1 to 0.2, 0.2 to 0.3, 0.3 to 0.5 mm., and blower gravels consist of gradations 0.5 to 1.0, 1.0 to 1.5, 1.5 to 2.0, and 2 to 3 mm. gradations. These sands and gravels should be washed dust-free; and they should be free of binding agents and dried absolutely.—*Steinbruch und Sandgrube,* vol. 39 (1940), no. 23, pp. 329 to 330; no. 24, pp. 347 to 350.

Gravel and Sand Tests

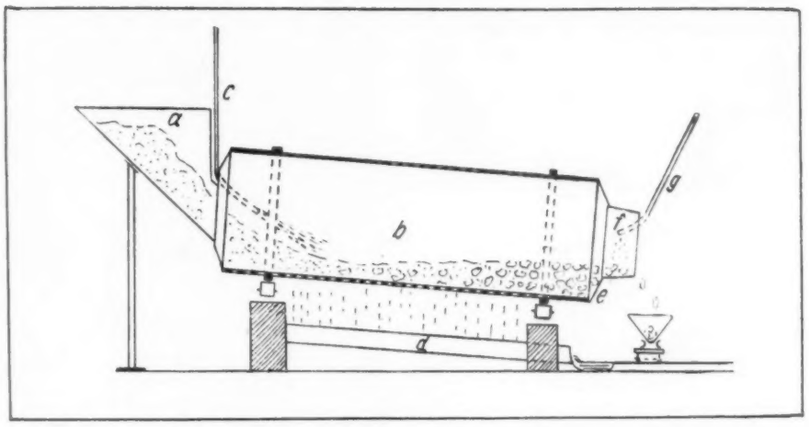
Consulting Engineer Karl Otto Schulz discusses simple tests on gravel and sand, referring to the determination of admixtures, granulation, gradation, density, and aggressive constituents and applying to gravel and sand for construction, gravel and sand for filters, and other purposes.

Foundry sands with 20 per cent. or more granules over 0.2 mm. in size are designated as coarse-grained; medium-grained sand has about 45 per cent. of its granules of 0.12 to 0.2-mm. size; and fine-grained sand has about 40 per cent. of its granules smaller than 0.12 mm.

Core sands, being clean-washed of binding agents, are given so-called core oils or core binders consisting mostly of linseed oil or other vegetable or animal oils or mineral oils; but resins, sulphite liquor and similar binding-effecting substances are also considered. In order to obtain maximum aëration definite specially close-defined groups of granular sizes must be used, the granule of which is selected according to the cast bodies to be made. Core sand for fine-walled castings (art castings) must have a fine granule, and there must be only little variation in the granule size of each core sand. The core sand should consist as far as possible of pure quartz, like the form sand. Alumina and alkali act destructively on the bindability of the core sand treated with core oil, an alumina content above 3 per cent. being so detrimental that the sand can not be used. Core sands are classified about 0.1 to 0.2, 0.2 to 0.3, 0.3 to 0.5, 0.5 to 0.75 mm.

Chalk-Separating Drum

B. Drechsler describes his arrangement for removing flint from raw chalk in a cement plant under his management. This arrangement effects a saving in power, causes less wear of the equipment, eliminates broken flint from the chalk, and reduces shut-downs and repairs experienced with the customary method.



A discarded drying drum was provided with longitudinal slots cut with a welding torch, then mounted in an inclined position so it could be rotated, and inclosed with a removable sheet metal housing.

The raw chalk passes from a hopper, *a,* into the drum, *b,* water being added as the material enters, from a pipe, *c,* overhead. The chalk sludge formed in rotating the drum passes through the longitudinal slots, to be collected in a channel, *d,* beneath and delivered to storage. The flint thus released from the raw chalk travels to the low end of the inclined drum, where it builds up to the discharge level of the narrowed end, *e,* of the drum. As the flint is ready to leave the drum through the outlet, *f,* it is rinsed with water from a spray pipe, *g,* to remove all chalk residues, the flint then dropping into a dump car.

In this arrangement the flint acts as a grinding or reducing agent for the chalk, and due to the slow rotation of the drum, no flint is broken to mix with the chalk. The arrangement is working so successfully that a designed plant is contemplated.—*Tonindustrie-Zeitung* (1940), vol. 64, no. 71, p. 572.

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3 COMPRESSORS
3 DRILL RIGS
Speeded the Work, Cut the Costs

Powered by International Harvester full Diesel Engines skillfully engineered to operate continuously at full-rated horsepower capacity. Equipped with the SCHRAMM built-in Electric Starter these big . . . powerful . . . 315 cu. ft. SCHRAMM Compressors are as easy to start and operate as a modern automobile. Completely water-jacketed cylinders maintain an even temperature for proper lubrication summer or winter.

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NEW MACHINERY and SUPPLIES

• Scraper Unit

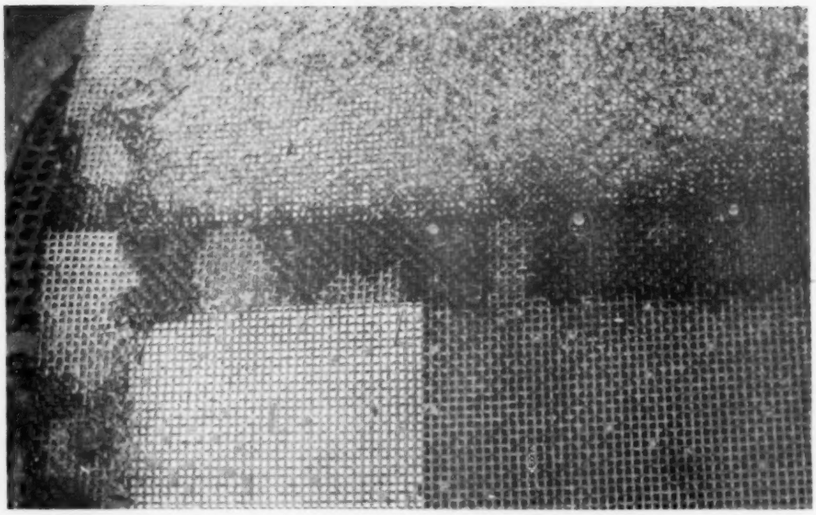
Filling the need for a high-speed, rubber-tired earthmoving machine, with the efficiency, construction and proven design of the Standard C Tournapull, but with a more powerful engine and a larger capacity Carryall, R. G. LeTourneau, Inc., has introduced two new Super C Tournapulls.

Powered by either a 130- or 150-horsepower 6-cylinder Diesel engine, the Super C utilizes this extra power to increase the production per hour by pulling a Model LP Carryall with a struck capacity of 12.1 and a heaped of 15 cubic yards.

Inasmuch as the LP holds four ..ore heaped yards of material than the Model LS used with the smaller C tournapull, production can be increased as much as 35 per cent.; further increasing earthmoving efficiency, cutting costs and earning more profit.

Like the fast-moving, job-proved Standard C, the bigger-powered Super C Tournapulls utilize the power of a Pusher unit to cut loading time, and to heap on capacity Carryall loads. They quickly attain high-gear hauling speeds up to 15 m.p.h., spread their loads on the fly, and highball back to the cut in one continuous operating cycle.

Standard equipment on the Super C Tournapulls includes hydraulic brakes on both the Tournapull and the Carryall, front crankcase guard with pull hook, front bumper, electric lights, starter, horn and cab. There are no extras to buy.



A non-blinding screen cloth known as "Wabbly Weave," marketed by the HarriSteel Products Company of New York. The above view shows a revolving screen equipped with regular weave (top) and Wabbly Weave at the bottom. Note how the lower section is free from plugged mesh while that on the top is almost completely blinded. The photograph was taken after nine days operation at a Long Island sand-and-gravel plant.

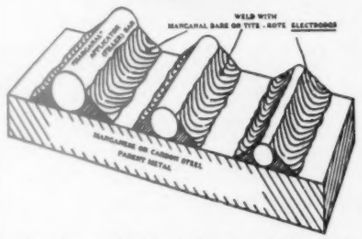
• Crane-Shovel

Announcement is made of a new standard 1-1¼ cubic yard crane-shovel, with large booster-controlled positive main-drum clutches and planetary variable speed rotation mechanism, by the Keystone Driller Company of Beaver Falls, Pennsylvania.

Known as Model 19-A, the truck frame and turntable are a one-piece castings. Side frames are of machined cast steel. Clutches are over-sized for required service and run cool under the maximum loads. Crawlers are smooth-running linked plates with ample ground bearing surface, carrying gravity pres-

Large capacity tractor-scraper unit.

STULZ SICKLES
Applicator Bars
for
FASTER WELDING



See how simple it is to weld MANGANAL applicator bars to the parent metal. Faster and more economical than bead-by-bead welding. Will outwear castings many times over. Naturally . . . MANGANAL is wear-resisting 11 to 13½% Manganese Nickel Steel.

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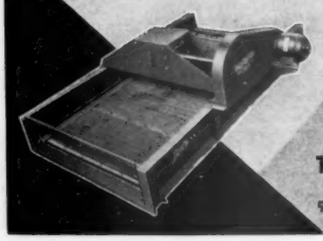

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Crawler-mounted 1¼-cubic yard excavator.

sure of 11½ pounds per square inch. There are three main shafts only above the deck, all of exceptional diameter. Drum clutches are of the internal expanding type.

The crowding device is a chain drive to a sprocket on dead center of the shipper shaft, eliminating internal torsion. The boom is of the tapered, box-girder type, with wide heel hinge and diaphragm reinforcement, the upper half being open to allow the internal carriage and operation of the double dipper handles.

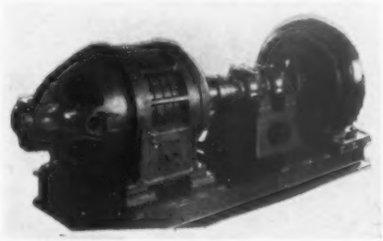
Power is supplied by a 4-cylinder heavy-duty gasoline engine. Diesel or electric power is optional.

• V-Belts

The Cincinnati Rubber Manufacturing Company has entered the field of multiple V-Belts and is supplying all standard sizes as regularly required for multiple-V drives. They are said to provide a well-balanced drive, smooth running, efficient handling of the power load and to be of uniform construction.

Cross-section of the new V-belt.

The construction of Cincinnati V-belts contributes definite advantages to smooth running, long life, and resistance to belt fatigue. A heavy, elastic fabric envelope takes up the outside wear, permits ready flexing and holds tightly to the groove. The load is carried by a cord section of high-tensile, low-stretch cords thoroughly impregnated with liquid rubber and then imbedded in a cushion of rubber providing lengthwise flexibility and easy flexing around the pulleys. Uniform cross-sections enable each belt to seat itself perfectly in the groove. Each belt is matched so that it will carry its equal share of the load.



Shop view of a newly-designed pump and motor drive being manufactured by the Millville Iron Works, Millville, New Jersey. The company makes a wide variety of equipment for the sand-and-gravel producer, including dredges, dredge pumps, driers and screens.

• Aggregate

The demand for decorative and weather-proof architectural concrete finishes for blocks, slabs, tiles and stucco has induced the General Cullet Corporation, Chicago, to place sample sets with full instructions (tile size) on the market, which will illustrate the various designs which can be successfully obtained.

The firm manufactures a weatherproof, sparkling artificial aggregate to achieve these results. It is available in various brilliant colors and standard mesh sizes.

• Haulage Unit

A rubber-tired industrial tractor, powered by a 90-horsepower Diesel engine and capable of hauling more than 13 tons of earth at 18 miles an hour, has been announced by Caterpillar Tractor Company. The company has also designed and built an 11-cubic yard, heaped measure bottom-dump, pneumatic-tired wagon to go with the new tractor. Hydraulic scrapers, especially designed for the machine are manufactured by the LaPlant-Choate Manufacturing Company, of Cedar Rapids, Iowa, and cable controlled scrapers, by R. G. LeTourneau, Inc., of Peoria.

The DW-10 tractor has been introduced after more than three years of intensive development work and field tests. It is built

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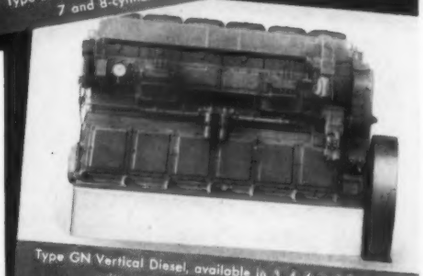
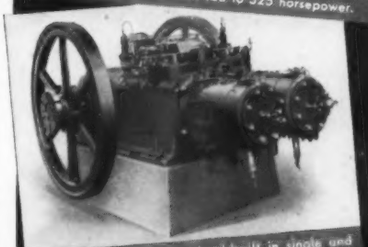
Type LS Diesel, largest of the Cooper-Bessemer line, built in 5, 6, 7 and 8-cylinder units and rated 440 to 1250-hp.



Type GN Vertical Diesel, available in 3, 4, 6 and 8 cylinder units, and rated 125 to 525 horsepower.



Type G-AW Horizontal Diesel, built in single and twin-cylinder units and rated 50 to 110 horsepower.

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Consider carefully just which diesel engine to use . . . and investigate Cooper-Bessemers. They range in size from 50 to 1250 horsepower . . . with a unit to fit your plant. They are not racehorses that wear out quickly, but medium speed engines that work and work, with minimum repairs and few shutdowns. They're rugged, with over a hundred years of "knowing how" built into them. They offer every modern feature for lube oil, fuel oil, and maintenance economies . . . economies that mean profits!

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Large capacity
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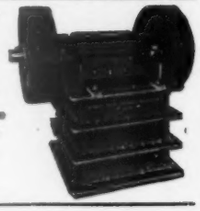

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Crushes Large Stone to 2" minus Down to Agricultural Dust

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Newly-designed Diesel tractor and wagon for transporting material.

specifically for use where speed, long hauls and other physical conditions are favorable to rubber tires.

Powered by the D468 "Caterpillar" Diesel six-cylinder, water-cooled automotive engine, the tractor weighs 14,500 pounds, and has a tractive effort of 13,000 pounds in low gear, with a loaded wagon or scraper.

The DW-10 tractor has a "high traction" differential, which gives increased pulling ability under unfavorable ground conditions, plus longer tire and engine life. Engineered for heavy duty hauling service, the differential applies greatly increased torque to either driving wheel, should the opposite wheel start slipping.

Trade Literature

Facts You Should Know About Rex Speed Prime Pumps, (Bulletin 384), 24 pages. Chain Belt Company, Milwaukee.

How Precision Insures Caterpillar Quality, (Bulletin 6231), 40 pages. *The Caterpillar Condensed Catalog,* (Bulletin 6425), 36 pages. Caterpillar Tractor Company, Peoria, Illinois.

Heavy Duty Industrial Diesel Engines, (Bulletin 5182), 36 pages Cummins Engine Company, Columbus, Indiana.

Roller Mills with Whizzer Separator and Air Drying System, (Bulletin 49), 6 pages. Combustion Engineering Company, Chicago.

Haydite—The Lightweight Aggregate. A Data Book for Engineers and Architects, 72 pages. American Aggregate Company, Kansas City.

Hardinge Feedometer . . . a Weight-Recording Feeder, (Bulletin 43), 4 pages. Hardinge Company, York, Pennsylvania.

An All-Electric Adjustable-Speed Drive, (Bulletin 310), 8 pages. Reliance Electric & Engineering Company, Cleveland.

Turbulaire Dispersion Dryer, (Bulletin D-1), 8 pages. Western Precipitation Corporation, Los Angeles.

Adjustable Stroke Diaphragm Pumps, (Bulletin P8-B), 8 pages. Denver Equipment Company, Denver.

Champion Rib-Cone Ball Mills, (Bulletin 43), 4 pages. Straub Manufacturing Company, Oakland, California.

Ransome Truck Mixers and Agitators, (Bulletin 175), 8 pages. Ransome Concrete Machinery Company, Dunellen, New Jersey.

Truck Mixer Charging Plants, (Bulletin B31), 16 pages. Heltzel Steel Form & Iron Company, Warren, Ohio.

Heavy Duty Type 16 Diesel Engine, (Bulletin 764), 8 pages. Chicago Pneumatic Tool Company, New York.

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"We looked at 'em all—found Joltcrete the best"

CLEVELAND BUILDERS SUPPLY CO.

Before investing a nickel in concrete products plant equipment, Cleveland Builders Supply Co.'s General Superintendent C. E. Ehle inspected other plants all over the country. He reports:

"We investigated all makes of high production machines and installed a Stearns Joltcrete because we found it made a better block. Six months afterwards, demand for this block forced us to install a second Joltcrete."

Over 100 Stearns Joltcretes in operation—22 plants have bought their second Joltcrete! Two have bought their third!

STEARNS
MANUFACTURING CO. - ADRIAN, MICH.
GENE OLSEN, PRESIDENT

The CONCRETE MANUFACTURER

April, 1941

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

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H. W. BAUMGARTNER
President

STANLEY A. PHILLIPS
Vice-President and Directing Editor

Field Editor:
W. E. TRAUFFER

Assistant Editor:
HARRY F. UTLEY

Circulation Manager:
W. T. KLUSSMAN

Advertising Manager:
JAMES E. MONTGOMERY
Telephone HARrison 9357
Chicago, Ill.

Eastern Advertising Manager:
W. A. WILSON
Room 430, 122 East 42nd St.
Telephone CALedonia 5-4438
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All the aggregates for the modern ready-mixed-concrete batching plant of Hoeffkin Brothers, East Alton, Illinois, are stock-piled and rehandled by a 1-cubic yard Bay City crawler crane of the latest type. Heltzel bins and batching equipment are used in this plant and Johns-Manville siding is used to protect the workmen and controls during winter operations.

To Spend $90,000

The Erie Materials Company of Fort Wayne, Indiana, has been purchased by local interests from the Erie Stone Company of Toledo.

The new owners will spend about $90.000 in enlarging the company's ready-mixed-concrete operations, it is reported.

Opens Sixth Plant

The Richter Concrete Corporation has opened a new plant to provide ready-mixed concrete in construction work at the new Wright aeronautical plant. Julius J. Warner, general manager, said that his concern would provide more than 75,000 cubic yards of concrete in connection with the airplane-motor factory.

The concrete-mixing plant will be permanent to serve the Lockland area upon completion of the Wright job. Jacob Vorherr has been appointed superintendent of the Lockland plant. The Richter concern operates five other plants in greater Cincinnati.

Attend Short Course

Owners, operators and employees of ready-mixed-concrete plants in Indiana attended a two-day short course at Purdue University, LaFayette, Indiana on February 5 and 6.

Professor R. B. Crepps of the school of civil-engineering was in charge of the gathering.

Erects Plant Structure

The Polo Cement Products Company of Sterling, Illinois, has just erected a new 40- by 60-foot building to house its plant.

The main concrete plant showing the covered belt-conveyor. Bulk-cement storage tank and elevator at right. Six of the fleet of 30 truck-mixers are shown lined up as the day's activities start.

Truck-Mixers Transport Shrink-Mixed Concrete at Indiana Ordnance Plant

SPEED is the keynote of the national-defense program. This is readily apparent at the $20,000,000 Kingsbury Ordnance Plant, now under construction for the War Department near Kingsbury, Indiana. Well ahead of schedule, this shell-loading plant, one of the country's big armament projects, is located on a tract of 13,000 acres of level land in the Kankakee River valley. The several hundred buildings being erected are of permanent construction and are, for safety's sake, widely separated from each other.

Thousands of cubic yards of quality concrete are being used in erecting these buildings. Many, notably the "igloos" used for the storage of high explosives and black powder, are of reinforced concrete throughout. The igloos have monolithic arch roofs and will later be covered with earth, and vegetation will be allowed to grow so as to conceal them from the eyes of enemy aircraft, should any ever arrive. Other structures will be located along the loading lines where the munitions are assembled. Still others will be used for inert (unloaded shells) storage, and for the storage of finished ammunition.

The main concrete plant is located near the center of the tract. The supply is augmented by two smaller plants near the northern and southern boundaries of the property. These plants are operated by the general contractor, the Bates & Rogers Construction Corporation, of Chicago, which is doing the job on a fixed-fee basis. All the concrete is central-mixed and deliveries are made to the various construction sites by Jaeger High-Dump truck-mixers mounted on Ford chassis. To attain the highest possible production the concrete is "shrink-mixed" at the plant, the mixing being completed *en route* by the truck-mixers, each of which carries about 2 cubic yards per trip. About 30 of these were in service early in March, but more are being added periodically. Ultimately it is expected that 36 units will be in operation. The average haul is less than a mile, while the maximum trip will not exceed 3 miles.

At present the main concrete plant is operating 16 hours daily and turning out about 1,000 cubic yards per day. The two smaller plants are in service eight hours a day, producing about 200 cubic yards each. All are equipped for 24-hour service, however, and a possible daily total capacity of about 2,500 cubic yards.

The main concrete plant uses bulk cement; that used in the small plants is received in paper bags. Coarse aggregate, which normally passes a 1-inch mesh and is retained on a ½-inch, is washed limestone and is received *via* gondola and hopper-bottom railway cars from the McCook, Illinois, plant of the Consumers Company, Chicago, and the Thornton, Illinois, quarry of the Material Service Company, also of Chicago. The concrete sand is shipped from the pits of the South Bend Sand & Gravel Company, South Bend, Indiana, and the Syracuse, Indiana, plant of the Sturm & Dillard Company of Columbus, Ohio.

Aggregates are transported to the top of the main concrete plant by a belt-conveyor 24 inches wide and about 300 feet long on centers. The bulk cement, received in covered hopper cars, is carried by a screw-conveyor and an in-

By HARRY F. UTLEY

closed bucket-elevator to the cement bin atop the 90-foot tower of the plant. When there is a surplus, the cement is diverted to a steel storage tank of 1,000-barrel capacity at ground level from which it can be withdrawn as needed and re-fed to the screw-conveyor.

The tower aggregates bin, octagonal in shape, is divided into four compartments with a cement bin in the center. Automatic weigh-batchers with mercoid switches on the scale beams apportion the components of the concrete mixture. Bin and batcher gates are air-operated and most of the operations are push-button controlled. Two 2-cubic yard Smith tilt-type mixers, operating alternately for 1-minute periods, keep the truck-mixers filled and moving. The storage units and much of the plant equipment were supplied by the C. S. Johnson Company.

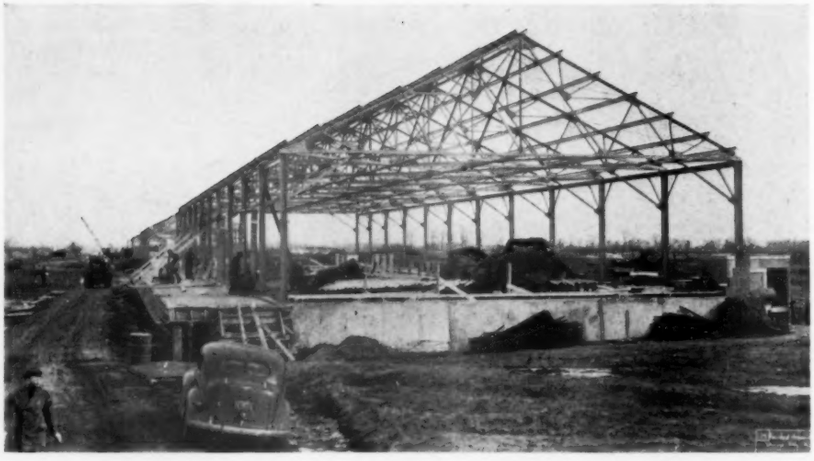
Concrete was first produced on January 22 and has come from the mixers in increasing quantities daily ever since as the truck-mixer fleet has grown and as the plant's efficiency has improved. With freezing weather encountered almost daily, aggregates and mixing water are, of course, heated at all times. Steam coils in the receiving pit thaw out and warm the sand and stone. They are protected from the cold and moisture while being transported to the top of the plant since the belt-conveyor is inclosed. More heat is applied in the plant storage bin by additional steam coils. When the installation was visited on March 6, the temperature of the air was 30 degrees while that of the concrete at the time of loading into the truck-mixers exceeded 60 degrees.

Each of the two smaller plants uses a 1-cubic yard drum-type mixer. All the concrete is designed for 3,500-pound strength, from 6 to 6½ gallons of water being used per sack of cement. The mix design, the making and breaking of the test cylinders, and the sampling and testing of the aggregates are supervised by the Robert W. Hunt Company of Chicago through its field engineer, Ray Sollenberger.

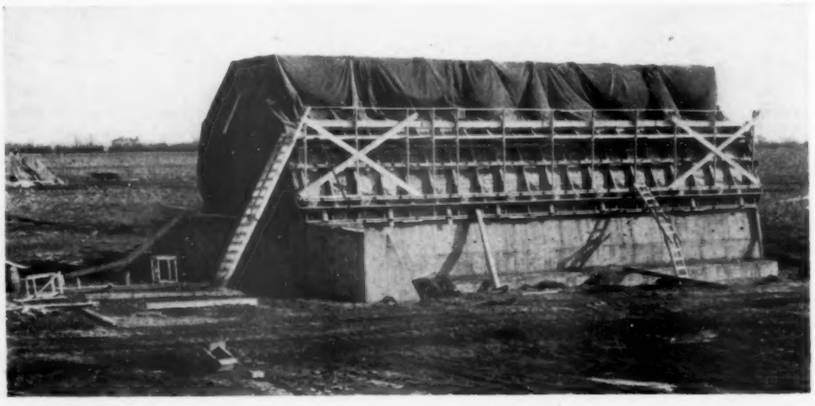
With the construction operations covering such a wide area, coördination of efforts is maintained through a two-way radio communications system operating on short wave. Every official car and the numerous offices, including those at the concrete plants, can be in instant communication with each other through the medium of the microphone and loud speaker. Both mobile and stationary units are operated by storage batteries. Individuals are quickly located and orders transmitted and acknowledged without delay over the air waves.

The 3½- by 8-mile tract is roughly bounded by the main-line tracks of four railroads—the Baltimore & Ohio, the Wabash, the Nickel Plate, and the Grand Trunk. From these lines a permanent 70-mile network of tracks has been laid to serve the completed buildings.

Major B. T. Rogers is the constructing quartermaster in charge of construction for the government. The works manager for the entire project is F. L. Copeland, of Bates & Rogers Construction Corporation. He is a veteran in the construction field and helped build Camp Grant at Rockford, Illinois, a munitions plant near Toledo, and the Hog Island shipyards during World War I. The architect-engineers are Giffels & Vallet, Inc., of Detroit, and Charles W. Cole & Son of South Bend, Indiana. Major W. J. d'Espinosa will be in command for the Ordnance Department after construction will have been completed about November 1 of this year.

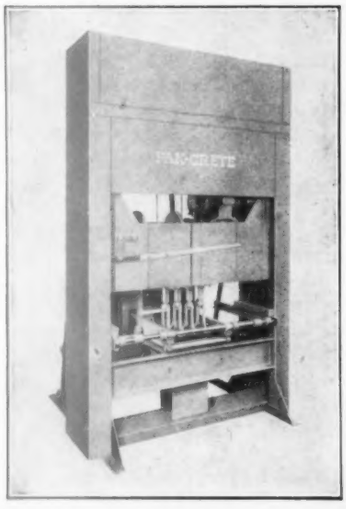


Construction view of one of the finished-ammunition storage buildings.



One of the "igloos" which will store explosives. Later on these will be covered with earth, making their location invisible from the air.

A LOT OF MACHINE FOR A LITTLE MONEY



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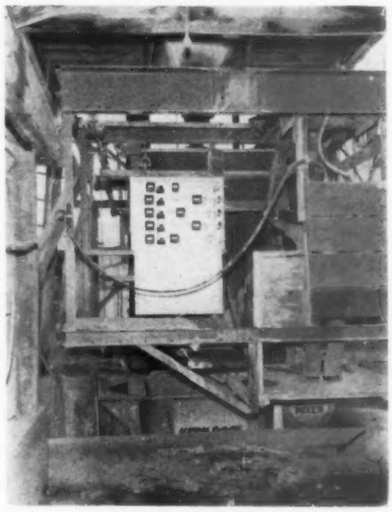
Oil-Field Demand Provides Excellent Market for This Ready-Mix Operator

THE Kern Rock Company of Bakersfield, California, is an example of a progressive company in a progressive city. Not so many years ago Bakersfield was noted chiefly as a stop-over point between Los Angeles and Northern California. Then came an oil-boom and this city became the center of one of the largest oil-producing sections in this country. The oil fields continue to grow rapidly and so do Bakersfield and the Kern Rock Company.

The original Kern Rock Company was a producer of sand and gravel only. It was owned by the Grant-Service Rock Company which in 1936 sold it to the present owners who retained the name. The old sand-and-gravel plant was at



Movable aggregate batcher in position to load truck-mixer below.

once replaced with a new plant. In November, 1937, the company went into the ready-mixed concrete business with a new plant in East Bakersfield.

Deliveries were made from this plant throughout Kern County, some hauls being as long as 60 miles one way. Concrete was supplied for all types of work, including highways, bridges, houses and buildings of all kinds. Sales were also made in the oil fields for foundations for rigs, boilers, pumps, etc. The oil-field demand grew so rapidly that in 1938 it was found advisable to erect a Madsen batching plant 16 miles northwest of Bakersfield at Rio Bravo, in the heart of the oil field of that name. Late in 1939 a Blaw-Knox batching plant was erected at Coles Levee, about 35 miles southwest of Bakersfield where a new oil field is being developed.

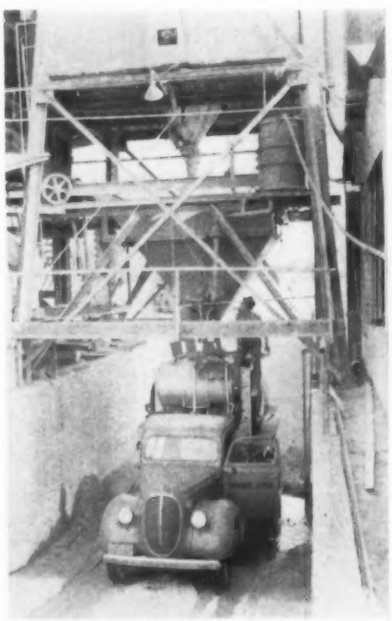
The Kern plant with five of the 3½-cubic yard truck-mixers in foreground.

Both of these plants are used almost entirely to supply oil-field demand and are operated only when wells are being sunk. A single oil rig, for example, requires about 110 cubic yards of concrete.

All the company's truck mixers are kept overnight at the East Bakersfield plant. Those used for the two auxiliary plants are loaded in the morning at the main plant and for the remainder of the day work from the auxiliary plants returning to the main plant at the end of the day or when the job is completed. A typical pour of 100 cubic yards was made from one of these plants in less than three hours with three truck-mixers.

Most of the demand at the main plant is now for various types of building construction. Three sizes of plain gravel, three sizes of crushed gravel, concrete sand and plaster sand are stored at this plant. According to Dan C. Sill, president of the company, no type of business is refused and any amount of concrete is sold to anyone to meet any desired specifications. No concrete is sold on a strength basis, which Mr. Sill believes is a detriment to the industry because test cylinders do not represent the true strength of concrete. Among the steadiest customers is a local concrete-products manufacturer who prefers to buy his concrete rather than to mix his own. The plaster sand is mixed with concrete sand when pouring floors for schools or other buildings. These floors are usually made four inches thick and the use of fine sand makes it possible to trowel up a good finish instead of putting on a top which would later crack. At least 5 sacks of cement per cubic yard are necessary to insure sufficient grout. Gravel graded from 1 inch down to ¼ inch is used for this type of work.

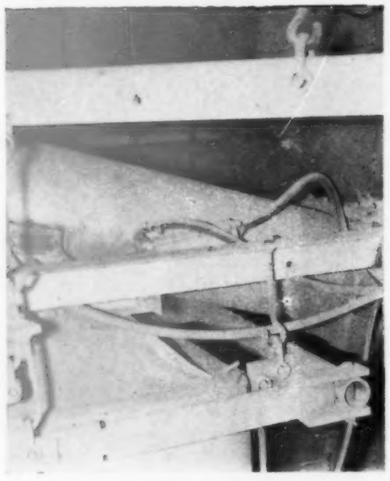
Bulk cement was formerly received in cars on a siding and was unloaded by a Fuller-Kinyon 6-inch Type C remote-controlled portable unloader. Early in 1941 the company purchased



Truck-mixer in loading position.

a special truck-trailer which hauls 120-barrel loads direct from the cement plant. This machine consists of an Autocar "Jeep" cab-over-engine tractor with dual rear axles and a pivot between them. A Fruehauf trailer is used. This truck-trailer delivers cement to all three of the company's plants.

At the main plant the unloading is done with the above-mentioned portable unloader. The cement is discharged into an 800-barrel steel tank under which is an inclined screw conveyor that feeds the cement into the 5,000-pound-capacity Noble weighing-batcher which is equipped with a Fairbanks dial scale. The conveyor is started by a push-button and is automatically shut off by an electric-eye control when the desired weight is reached. An air-hammer vibrator is used to clean out the batcher and the discharge gate is air-operated. When other brands or



Screw which feeds cement to batcher.

types of cement are specified they are supplied in sacks from a warehouse. This cement is dumped into a hopper from which an elevator feeds it to the cement batcher.

Aggregates are received in trucks from which they are discharged into a hopper and thence by a reciprocating plate-feeder into a belt-bucket-elevator. A split chute feeds in each direction on a shuttle belt-conveyor which discharges into any of the 9 storage compartments. The v-shaped wooden bin structure has a total capacity of 425 tons. Gates on one side are used for loading dump trucks.

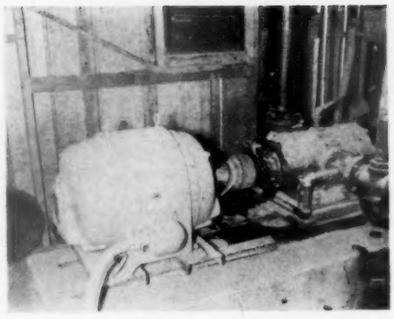
Under the bin is a track for a travelling car on which is mounted a Stephens-Adamson 4-cubic yard aggregate-weighing batcher with a 4-beam scale. This car is powered by a 5-horsepower electric motor and can be quickly "spotted" under any desired bin compartment. Sand and two sizes of gravel are used in most mixes and these are weighed cumulatively under their storage compartments. The speed with which this car moves makes it possible to deliver a complete batch in a minute.

The loaded aggregate batcher is run to the extreme end of the track, where it is over the truck-mixer loading runway and under the cement batcher. Inside the aggregate batcher is a central wedge-shaped compartment of about 10-sack capacity into which the batched cement is discharged. This compartment is so designed that the cement does not begin to flow into the truck-mixer until after the aggregates have started to flow. This ribbon discharge effects a partial preliminary mixing which increases the effective capacity of the truck mixer.

Water from the city mains is measured in a float-type tank from which the driver fills the truck-mixer tank. The water is added to the mixture either en route or at the job as specified.

The travelling aggregate batcher is used chiefly for loading mixer trucks but it is also used at times for dry-batching aggregates into dump trucks. The plant lay-out is such that additional aggregate-storage compartments and bulk-cement tanks can be installed at any time without adding to or changing the present batching equipment. With the exception of the cement-batching equipment all the plant equipment was supplied by the Stephens-Adamson Manufacturing Company.

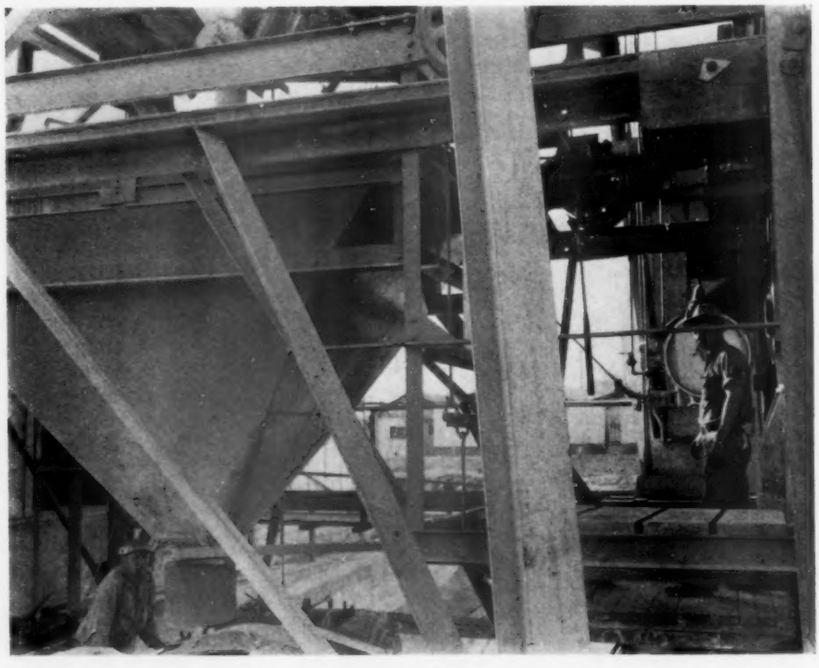
One man operates the entire plant, taking and transmitting orders, operating the batchers, and loading the truck-mixers. Extra help is required only when aggregates or cement are being unloaded. The plant has produced as much as 65 cubic yards of concrete in an hour. It has never been operated at full capacity for an entire day but has often turned out over 300 cubic yards a day.



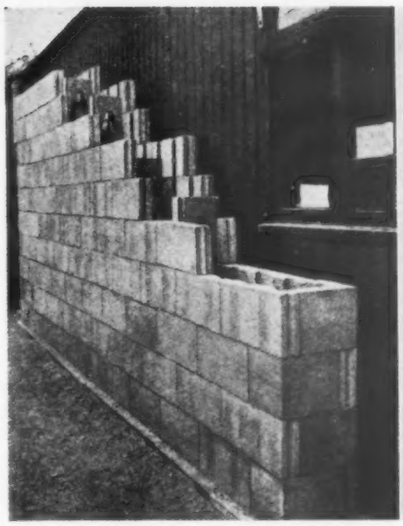
Rotary compressor which supplies air to the plant.

The original fleet of 4 truck-mixers has grown to 9, of which 7 are 3½-cubic yard Jaegers with Hercules independent gasoline-engine mixer drives. These are mounted on Autocar 6-wheel trucks with chains between the two rear axles. One is a 1½-cubic yard Jaeger with a Jackass hoist, and is mounted on a Ford V-8 chassis. This is used for special jobs including deliveries to the concrete products plant already mentioned. The latest Jaeger mixer was bought early in 1940. This is also mounted on a Ford V-8 truck chassis.

Air for operating gates in the plant and for other purposes is supplied by a Worthington tank-mounted compressor. A Fuller Company rotary compressor supplies air for operating the portable unloader.



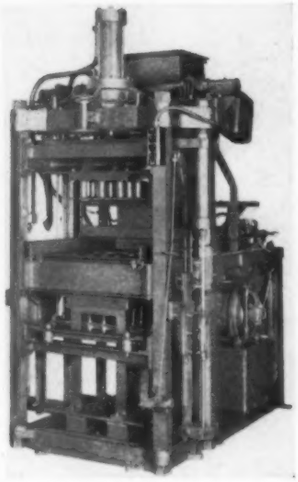
Another view of the movable aggregate batcher preparing to charge one of the truck-mixers.



A NEW type of revetment for air-raid protection formed with precast concrete slabs has been designed by the Cambridge Artificial Stone Company, Ltd., of Cambridge, England. Dovetail concrete slabs are placed transversely between the two leaves of the wall, locking the wall slabs together and forming a rigid structure without mortar joints. A wall 15 feet long by 8 feet high is quite rigid without any concrete filling inside, according to the February, 1941 issue of *Concrete Building & Concrete Products* (London).

The wall blocks measure approximately 18 inches long by 9 inches deep by 3 inches thick. The ties are 9½ inches long, 9 inches deep, and 4 inches thick, and the dovetails on the ends engage in slots provided in the blocks. The cost of this type of wall is said to be less than the cost of sandbags, and approximately half the cost of renewing bursted and rotted sandbags.

HYDRAULIC VIBRA-PRESS



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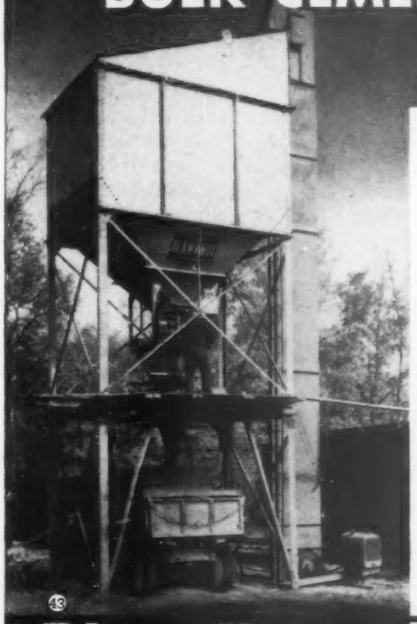

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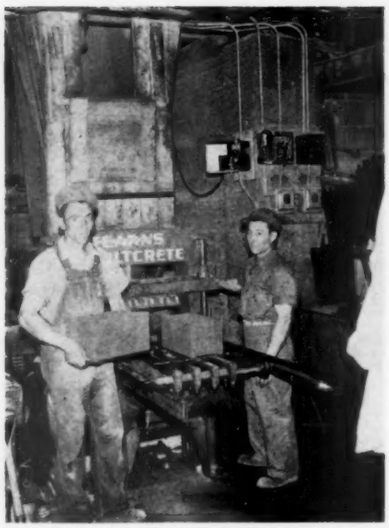
The CONCRETE MANUFACTURER

Aggressive Merchandising Swells Harve Kilmer's Block Business; Grows to a Million Units a Year

Harve E. Kilmer, general manager of the Iowa Concrete Crib & Silo Company, in a characteristic pose in his modern concrete-block office.



The vibrating block machine which is used chiefly for the manufacture of light-weight blocks.

THE concrete-products industry is now riding high on a wave of building construction which promises to make 1941 by far the best year in its history. This "boom" is one of those things that occur now and then but the part concrete products are playing in it is not just an accident. Those in the industry or familiar with it know that behind this prosperity lie many years of intensive and often unremunerative effort. Producers of concrete products have had to overcome the prejudices left over from a previous "boom" period when concrete-blocks were made in nearly every back yard and everyone was happy if they held together until they were laid on the job. Producers have had to work unceasingly to get their products included in building specifications and to get them accepted by architects, engineers, etc. The dropping off of building construction volume to record low levels in the early thirties did not simplify the problem.

A representative producer of concrete products is the Iowa Concrete Crib & Silo Company, of Des Moines, Iowa. Harve E. Kilmer, general manager of this company, has been active in its affairs since it was founded. He is a past president of the National Concrete Masonry Association. This company was formed in Oskaloosa, Iowa, in 1918 to make concrete silo staves and to erect silos. Later ventilated shutter staves for corn cribs were added. In 1926 the plant was moved to the present location in Des Moines as the biggest market was in that rich agricultural area.

The production of cinder-concrete blocks was begun in 1928 when a tamper machine was installed. This product gained gradual acceptance and encouraged the company to make gravel-concrete blocks as well.

In 1931 the silo and crib business totalled $154,000. In 1932 the depression and plummeting agricultural prices made themselves felt and sales were less than $4,000 with the same amount of advertising and the same sales force as in the preceding year. Only then did the company really begin to push the sale of concrete masonry units. The

One of the two stripper block machines used to make gravel-concrete blocks.

This general view shows part of the yard, the plant and the modern new office building. The tall building in the background does not belong to this company.

sales of this product increased at least 50 per cent. each succeeding year. In 1940 for the first time sales reached the equivalent of 1,000,000 standard 8-by 8-by 16-inch blocks. The silo and crib business now averages about $40.000 annually but is of secondary importance.

Behind this record, however, lie years of concentrated effort during which many obstacles had to be overcome. This plant lies in the heart of a clay-products district with seven active plants within a 30-mile radius, four of them in the city. The masons and bricklayers first had to be sold, which was done by stressing the advantages of concrete-strength, economy, cost, etc. The practice of clay-brick makers of shipping away the best and hardest bricks and selling the softer bricks locally also helped.

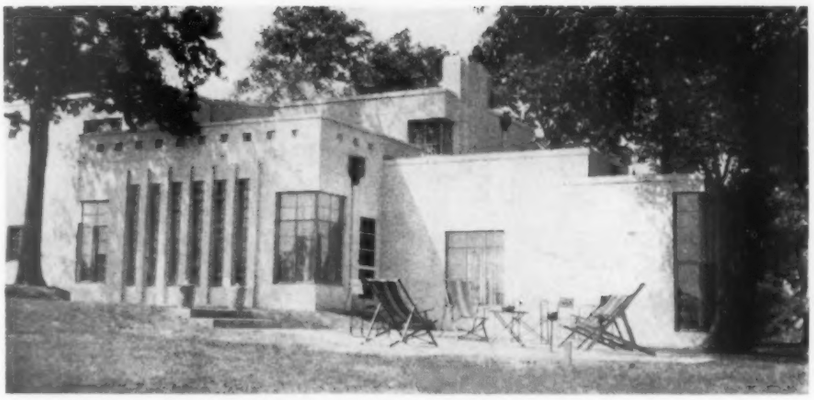
At one time clay tile had been widely used for house foundations and cellar walls. More recently monolithic con-

Moving some special products into the curing rooms. Note the candy-dispensing machine at the right.

crete came into favor. Now concrete blocks are used for 60 to 70 per cent. of this work. Cellar walls of concrete blocks were more water-resistant than their competitors but at first, in order to overcome prejudice, the outside of each wall was coated with a waterproof asphalt paint free of charge. Most of the cellar walls are now left unfinished inside.

Houses and small buildings have been the chief outlets for the company's products. The company has never gone after sales for large buildings because the light-weight aggregates required for this work are not obtainable in this area at a reasonable cost. Some light-weight blocks are being sold for this and other types of construction.

The original small tamper block machine in this plant was supplemented in 1931 by an Anchor tamper and in 1933 by a large semi-automatic tamper machine. In 1939 a Stearns No. 7 Joltcrete machine was installed and is used chiefly for making light-weight blocks.



An ultra-modern, all-concrete residence most of the material for which was supplied by the Iowa Concrete Crib & Silo Company.

Two Stearns Clipper strippers were added in 1940 to make gravel-concrete blocks. A New Monarch stave machine has been installed under the old Anchor tamper and another old tamper machine was converted to make concrete bricks, eight at a time on end. In 1933 the company started making concrete joists on a vibrating table which is kept busy by the demand for this product. A new 18-cubic foot Stearns mixer, a 14-cubic foot Blystone mixer and a 27-cubic foot Besser mixer supply all these machines.

The prevailing price for standard 8-by 8-by 16-inch blocks is 8 cents at the plant. Partly for this reason houses can be built of the company's products at a cost very close to that of wood construction in spite of the fact that standardized designs for houses have never become popular here as they have in other sections. In order to prevent cracking of the joints due to mortar shrinkage ¼-inch smooth round reinforcing rods are laid in the courses under and over each window. When the customer is unwilling to pay for this reinforcing it is put in anyhow free of charge.

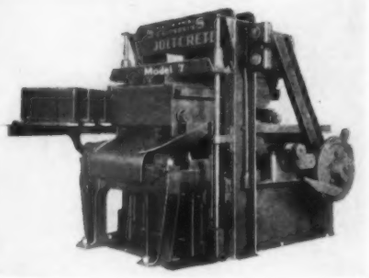
Standard proportions of aggregates are used for the various products made. Shot gravel, concrete sand and molding sand are used, the latter in order to obtain maximum strength and the best possible finish. The curing is done in five steam rooms holding 1,500 blocks

The 27- and 18-cubic foot mixers which serve the block machines.

each and the products are kept under covered out-door storage for some time before they are exposed. None of the company's products have ever been rejected. An effort is made to keep on hand at all times 125,000 standard blocks and proportionate quantities of other products.

No unusual sales methods are used by the company. Two salesmen are employed to sell concrete blocks and other products in Des Moines, and two other salesmen sell cribs and silos in the surrounding area. Some newspaper advertising is done and every now and then a model house is built.

The Vibration Machine Supreme



Vibration under pressure — 7,200 blows per minute—and ruggedly built to give long life, the Joltcrete machine is the choice of the wise concrete-products operator. Produces clean-cut, high strength units in any size, and gets the most out of a bag of cement. Built in three sizes with capacities of 7 to 9 standard units per minute.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers, and Cast Iron and Press Steel pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager Columbus, Ohio

The CONCRETE MANUFACTURER

Austin & Smith Prove THE OPPORTUNITY

Mr. Austin of Atlanta says:

January 3,1940

As a matter of curiosity I would be interested in knowing whether any of your plants have exceeded our sales for last year which total slightly in excess of four and one-quarter million on a single brick basis.

January 6, 1941

Sold over four million again this year.

Mr. Smith of Portland says:

You perhaps are quite well acquainted with the extensive line of cement products we manufacture.

We find in the operation of the various machines for producing concrete units the variation of the human element controls the output, and of course regulates production and ultimately governs the profit.

Our several checks have always brought us around to brick, made on your brick machine.

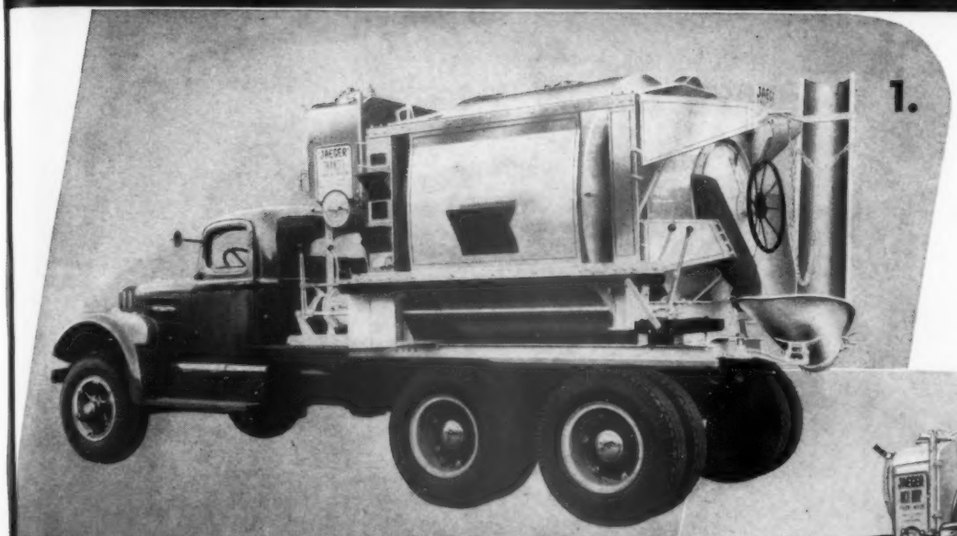
The automatic principle of feeding, palleting, and the straight line production principle, reduces the human element to a known quantity. We know absolutely what a brick or a dozen brick cost, and we don't mind telling you that our costs are low enough that we are able to compete with any brick on the market, insure ourselves a legitimate profit and give the customer a better brick.

YOU owe it to yourself and your future to learn how you too can become an exclusive DUNBRIK Manufacturer like Mr. Austin or Mr. Smith. Learn how this automatic line production machine will produce quality products from local low cost raw materials—how these products are made in a full range of colors, shades and textures —how the multiple sizes reduce construction costs—how you too can become the owner of a profitable franchise protected business.

Write today for free books. They tell the complete story. No obligation.

W. E. DUNN MFG. CO. 420 WEST 24th STREET, **HOLLAND, MICH.**

Only JAEGER Equips You to Meet EVERY Ready-Mix Demand

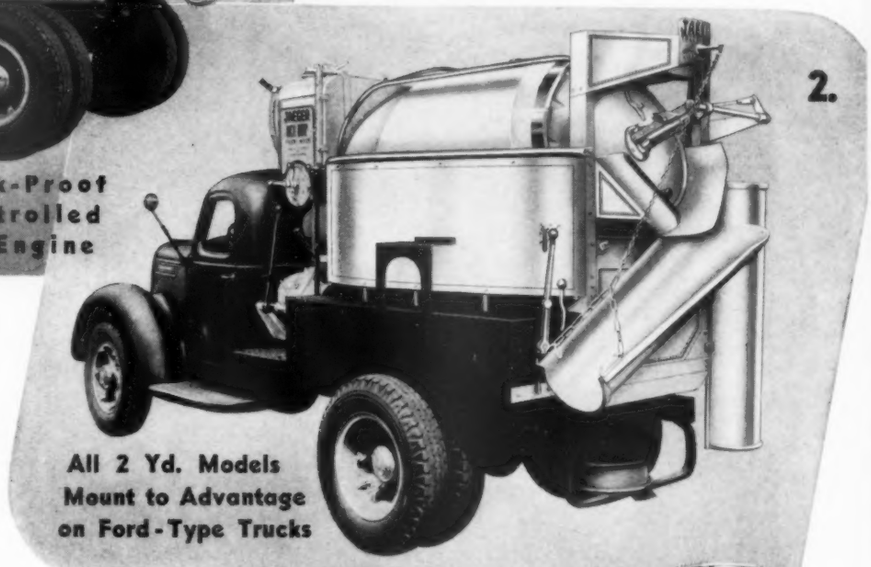


1.

All Jaegers Have 2-Speed Shock-Proof Transmission—Vacuum Cab Controlled Truck Engine Drive or Separate Engine

Standard LOW CHARGE

Type: Lowest, most economical to load; fastest on the market to mix and discharge — produce maximum daily yardage of proven higher strength concrete. Sealed drum meets any specification. Sizes 2, 3, 4, 5, 5½ yds.



2.

All 2 Yd. Models Mount to Advantage on Ford-Type Trucks

HIGH DUMP Types:

(2) Top Loading Models with "Sealed Drum"

(3) Or Combination Top and End Loaders (Pat'd)

Far outselling all other high discharge truck mixers today because they are fastest to load, mix and discharge any slump concrete — and are the only high discharge truck mixers that meet every specification and job condition.

"Sealed Drum" Models take full load in one quick drop through the top. Fast Vacuum-Controlled Discharge Door seals against loss of moisture and heat in winter concrete.

Jaeger End Loading Hopper Attachment (specially adapted to older or temporary plants not equipped for ribbon loading) offers many advantages over all other end loaders — and does not interfere with use of Top Loading Door where specified by engineers. (See details at right.)

Both types are built in 2, 3, 4 and 5 yd. sizes.

3.

Jaeger Charging-Discharging Hopper Attachment Permits Top or End Loading in Order to Meet Conditions - - -

The only end-loader which does not constrict drum opening and slow up charging and discharge. One quick turn of hand wheel opens Discharge Gate — no need to move entire Hopper (requiring many turns of a wheel) — no second seal to leak or wear.

JAEGER PORTABLE HOPPER

Saves Truck Mixers Waiting—Means 25% More Pay-loads per Day on Average Job. Tows to job behind truck mixer — takes full 2 or 3 yd. batches. One hopper serves almost any job.

JUST OFF PRESS-- VITAL FACTS FOR READY-MIX PLANTS

Complete 1941 Data, Models, Specifications, Prices, Terms

THE JAEGER MACHINE COMPANY
602 Dublin Avenue, Columbus, Ohio

Send us newest information on ☐ Standard LOW CHARGE Truck Mixers, Agitators, ☐ HIGH DUMP Models, ☐ Portable Hoppers, ☐ Auto-Pavers and Spreaders, ☐ Pumps, ☐ Mixers, ☐ Hoists, ☐ Carts.

Name_____

Address_____

The CONCRETE MANUFACTURER

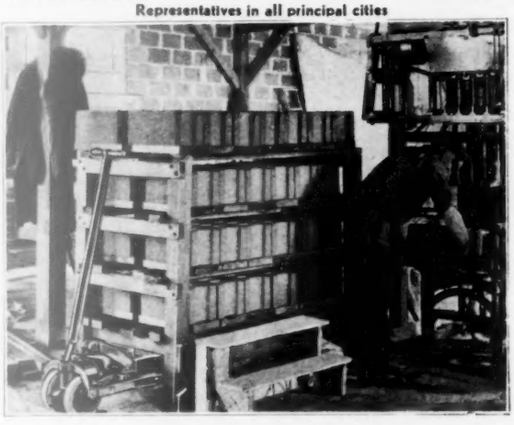
BARRETT LIFT-TRUCKS
ONE MAN HANDLES 48 BLOCKS
NO BREAKAGE

Available for fifteen days free trial without obligating you to buy.

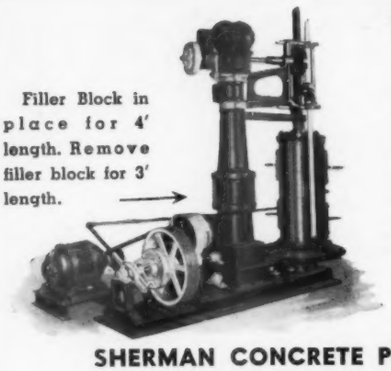
Handle your green concrete products the way that more than 800 other concrete products plants do, WITH BARRETT LIFT-TRUCKS EQUIPPED WITH A SUPER-SPRING FRAME AND RUBBER TIRES. Eliminate breakage—jogging out of shape and spoilage. Save time, money and labor by eliminating all unnecessary handling and breakage. Take your blocks direct from the machine to the curing room—with ease and dispatch. One man handles 48 blocks of the 8x8x16 size—or, 32 blocks of the 8x12x16 size.

Write for illustrated circular.

BARRETT-CRAVENS COMPANY
3251 West 30th Street CHICAGO, ILL.
Representatives in all principal cities



Filler Block in place for 4' length. Remove filler block for 3' length.



SHERMAN'S

Latest combination concrete pipe machine. Range in sizes 4" through 36" in 3' or 4' length, showing sectional core, jacket, segment top ring, and pallet.

Write for Prices and Information

SHERMAN CONCRETE PIPE CO.
KNOXVILLE, TENN.

HOTEL PHILADELPHIAN
FORMERLY HOTEL PENNSYLVANIA

DANIEL CRAWFORD, Jr., Manager
39th and CHESTNUT STREETS
PHILADELPHIA, PENNA.

Our courteous and competent staff will give you the utmost in friendliness, comfort and service. Conveniently located to all stations, and only five minutes away from the heart of the business section.

600 ROOMS each with bath from $2.50 up

Lounge and Restaurants. Unrestricted Parking to 3 a.m.

PIT AND QUARRY
Research Department
538 South Clark St., Chicago, Ill.

Please send me catalogs and prices concerning the following items checked below:

- ☐ Agitators, sand and Gravel
- ☐ Agitators, Slurry
- ☐ Aggregate — Bituminizing Plants
- ☐ Air cleaners
- ☐ Air compressors
- ☐ Asphalt Mixing Plants
- ☐ Asphalt Mixers
- ☐ Bag filling and weighing machinery
- ☐ Bags, cloth
- ☐ Bags, paper
- ☐ Balls, steel
- ☐ Barges, steel
- ☐ Batcher Plants
- ☐ Belt Dressing
- ☐ Belt fasteners
- ☐ Belting, conveyor and elevator
- ☐ Belting, transmission
- ☐ Belt lacing
- ☐ Belt plates
- ☐ Belt rivets
- ☐ Belt tighteners
- ☐ Bin gates
- ☐ Bins, concrete
- ☐ Bins, steel
- ☐ Blasting supplies
- ☐ Blasting powder
- ☐ Blocks, friction
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- ☐ Bodies, Motor Trucks
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- ☐ Buckets, Dragline
- ☐ Buckets, Orange Peel
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- ☐ Calcining Machinery
- ☐ Car Dumpers
- ☐ Car Pullers and Movers
- ☐ Carriers, Belt
- ☐ Cars, Dump
- ☐ Cars, Kiln
- ☐ Castings, Manganese Steel
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- ☐ Chains, Conveyor and Elevator
- ☐ Chains, Power Shovel, Crane and Dredge
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- ☐ Clutches
- ☐ Clutches, Magnetic
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- ☐ Cones, Washing
- ☐ Conveyors, Apron
- ☐ Conveyors, Belt
- ☐ Conveyors, Pneumatic
- ☐ Conveyors, Screw
- ☐ Conveyors, Skip
- ☐ Coolers
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- ☐ Couplings, Hose
- ☐ Cranes, Locomotive
- ☐ Cranes, Overhead Traveling
- ☐ Cranes, Truck
- ☐ Crushers, Cone
- ☐ Crushers, Disc
- ☐ Crushers, Gyratory
- ☐ Crushers, Hammer
- ☐ Crushers, Jaw
- ☐ Crushers, Ring
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- ☐ Crushers, Rotary
- ☐ Cutter Heads, Dredging
- ☐ Derricks
- ☐ Draglines, Cableway
- ☐ Draglines, Revolving Boom
- ☐ Dredges, Dipper
- ☐ Dredges, Hydraulic
- ☐ Dredges, Ladder
- ☐ Drill Sharpening Machinery
- ☐ Drills, blast hole
- ☐ Drills, Diamond Core
- ☐ Drills, Hand Hammer
- ☐ Dryers, Rotary
- ☐ Dryers, Sand and Gravel
- ☐ Dust Collecting Systems
- ☐ Dynamite
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- ☐ Screens, Shaking
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- ☐ Winches
- ☐ Wire Cloth
- ☐ Wire Cloth, Manganese Steel

To be used for .....

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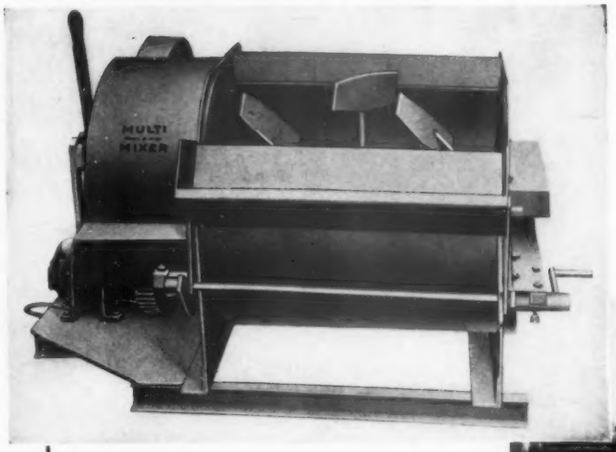
Address ..... *City* ..... *State* .....

MULTIPLEX
MULTI-MIXER



Many concrete-products operators, like the Cecil Cement Block Company of Detroit, have solved the problem of producing quality concrete block at the lowest possible cost the Multiplex way. Two MULTIPLEX standard power tampers served by a Multi-Mixer have ended production worries for this operator for a long time. You, too, can benefit by using time-tested MULTIPLEX equipment in your plant. Write for catalog.

This "ace" of mixers comes in six sizes with your choice of drive and discharge arrangement. Reverse paddle action . . . less liner wear.

The *Multiplex* CONCRETE MACHINERY CO., ELMORE, OHIO

QUINN PIPE FORMS

HEAVY DUTY PIPE FORMS

Our Heavy Duty type with Adjustable Locks is shown above. Quinn Heavy Duty Forms are also available with a new wedge-type lock.

HAND or WET PROCESS

Make concrete pipe on the job with Quinn Pipe Forms. They can be handled by less experienced labor and produce uniform concrete pipe of highest quality. Quinn Pipe Forms make pipe conforming to A. S. T. M. requirements as to wall thickness and other standards.

Quinn Heavy Duty Pipe Forms are built to give more years of service — sizes for any diameter pipe from 12 to 84 inches — tongue and groove or bell end pipe — any length. Backed by over 30 years of service in the hands of contractors, municipal departments and pipe manufacturers.

MEDIUM DUTY PIPE FORMS

Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. For making pipe 12 to 60 inches in diameter —any length.

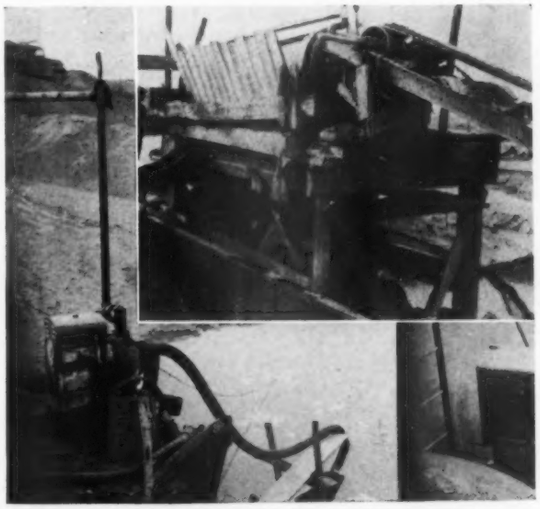
WRITE TODAY

Get complete information on prices and Special Construction Features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs. Also manufacturers of Quinn Concrete Pipe Machines for making pipe by machine process.

QUINN WIRE & IRON WORKS 1627 12th ST. BOONE, IA.

DUAL PRIME PUMPS

IN QUARRY AND GRAVEL OPERATIONS!



30 M CMC Dual Prime furnishing water to gravel Washer for Tobin Quarries of Kansas City.

Write for NEW CATALOG on CMC Dual Prime Pumps from 1½" to 10". Also latest Mixers and Batching Equipment for products and pipe plants.

CONSTRUCTION MACHINERY CO., WATERLOO, IOWA

Miles CONCRETE EQUIPMENT

SIMPLE AS A-B-C

Miles Equipment does not require the services of an expert mechanic. Anyone without previous mechanical experience can keep a Miles machine in perfect operating condition.

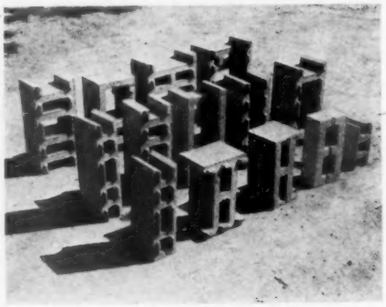
Write for Catalog

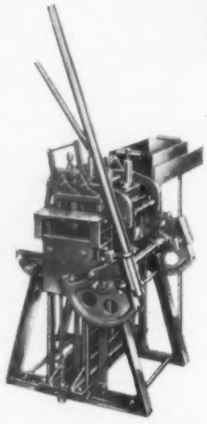
The Miles Manufacturing Company

Dept. 2, Jackson, Michigan

INTERLOCKING BLOCKS LAID *without* MORTAR

- Blocks made on this improved machine being mortarless and interlocking, allow unskilled labor to be used for laying up.
- Machines leased to responsible operators in protected territories, protecting your profits and your markets.





High-strength mortarless, interlocking blocks can be produced on this patented improved double-press machine without tying up your money in expensive equipment. Manufactures units meeting all code and specification requirements at a lower cost than any other machine on the market. Available for all sizes and types of units. Powerful pressure achieved by long, hand-operated levers. Get the facts **now!**

MORTARLESS TILE MACHINE COMPANY, Inc.

3328 San Fernando Road, Los Angeles, California

INFRINGEMENT NOTICE

To Builders and Users of Block Machines:

Please take notice that the Stearns Manufacturing Company of Adrian, Michigan, are the sole and exclusive licensees of "Joltcrete" vibration block machine patents and patent rights and have the sole and exclusive right to manufacture and sell such equipment.

At the present time there is a suit for patent infringement pending against H. W. Bell Company of New York City, a user of infringing equipment.

Others manufacturing infringing equipment and the users of such equipment will be prosecuted to the fullest extent of the law.

LOUIS GELBMAN, *Inventor*

CRESCENT PIPE FORMS

Crescent Pipe Forms are built of steel sheets with angle and bar reinforcements for strength and durability. They are lighter in weight, easier to operate, and offer more profit to the user. Both casing and core easily removed from cast pipe. Made in all sizes and lengths, in all styles.

Ask for full particulars.

FLINT & WALLING MFG. CO., INC.

Kendallville, Indiana

CONCRETE FLOORS . . . YOUR BIG UNDEVELOPED MARKET

This subject was the highlight of the recent Chicago concrete convention. The new, exclusive STONEX process provides the solution. It enables products makers to fill the need, at low cost, for a finished concrete floor. Learn more about the STONEX process and the licensing plan with protected territories. Write for complete details.

STONEX INDUSTRIES

500 N. W. 79th St. Miami, Fla.

First! In Every Important Truck-Mixer Development
SMITH-MOBILE Leads

The amazing success of Smith-Mobile Truck Mixers on jobs all over the country, comes as a result of long, practical experience. Smith engineers pioneered the many features found on present day HIGH DISCHARGE truck mixers. They spent ten years in intensive research and field tests. Then came the announcement of the new Smith-Mobile. Quantity production began four years ago and since then sales have increased by leaps and bounds. Today — Smith-Mobile is the acknowledged leader in the field with an enviable record of achievement.

1st. Smith-Mobile was the first HIGH DISCHARGE truck-mixer and the first truck mixer to eliminate the need for a hoist or ramp.

1st. Smith-Mobile was the first truck-mixer whose every feature of design was based on the requirements of high discharge service.

1st. Smith-Mobile was the first truck-mixer with a CONTROLLED DISCHARGE, enabling the operator to pour concrete fast or slow, without segregation.

1st. Smith-Mobile was the first truck-mixer to provide VISIBLE MIXING and is still the only machine in which the entire batch is visible while mixing.

1st. Smith-Mobile was the first truck-mixer equipped with FEED CHUTE CHARGING instead of old style loading hatches.

1st. Smith-Mobile was the first high discharge truck-mixer to provide for shrinking and mixing of the batch as the materials enter the drum.

1st. Smith-Mobile was the first truck-mixer, and is still the only truck-mixer, to introduce water through the feed opening instead of using water bells.

1st. Smith-Mobile was the first truck-mixer equipped with a steep distributing chute, especially ideal for dry concrete.

So why take chances on new and untried truck-mixers. Play safe! Buy the dependable Smith-Mobile. All standard sizes available both as truck-mixers and as agitators. Write for catalog 198-A.

The T. L. SMITH COMPANY
2887 N. 32nd St. Milwaukee, Wis.

No. 4 Smith-Mobile (4-1/3 yds. cap.) 5¼ yds. Agitator.

THE *Modern* TRUCK MIXER and AGITATOR

A 3150-1P

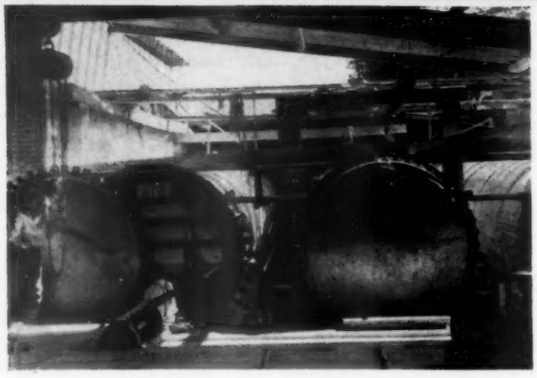
The CONCRETE MANUFACTURER

Lay Your Own PROFIT FOUNDATIONS in 1941 with a JACKSON & CHURCH Concrete Brick Machine

Piling bricks from press to car. Rate 2,000 per hour.

BETTER BRICK AT LOWER COST

because produced under approximately 150 tons pressure by the Jackson & Church Press, insuring uniform texture and density . . . sharp edges and corners . . . record high output and unequalled low costs. Both faces finished alike . . . no lost time in sorting or laying. With these advantages, you can profitably compete with clay brick in quality and economy.



High Pressure Steam Curing

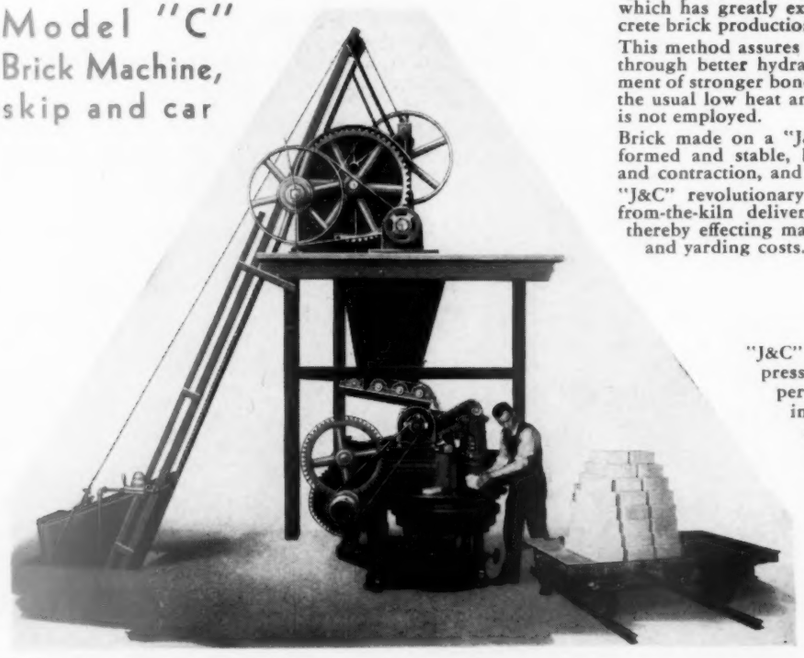
"J&C" pioneered and developed high pressure steam curing, which has greatly expanded the profit possibilities in concrete brick production.

This method assures a higher strength unit for a given mix through better hydration of the cement, plus the development of stronger bonding agents than can be obtained under the usual low heat and moisture conditions where pressure is not employed.

Brick made on a "J&C" Press are light-colored, perfectly formed and stable, being practically free from expansion and contraction, and from future internal disruptive action.

"J&C" revolutionary steam curing means speedy, direct-from-the-kiln delivery, without yard stocking or aging, thereby effecting material savings in stock pile investment and yarding costs.

Model "C" Brick Machine, skip and car



Making Concrete Brick on the Model "C" Machine. Available in capacities to suit your requirements.

"J&C" Presses mould perfect brick under high pressure at capacities of 1300 to 1500 units per hour for Model "C" machines. They insure maximum strength and density per mix of aggregate. NO PALLETS are used, as brick is taken direct from machine and stacked. Bricks can be colored in the mix, or sprayed later.

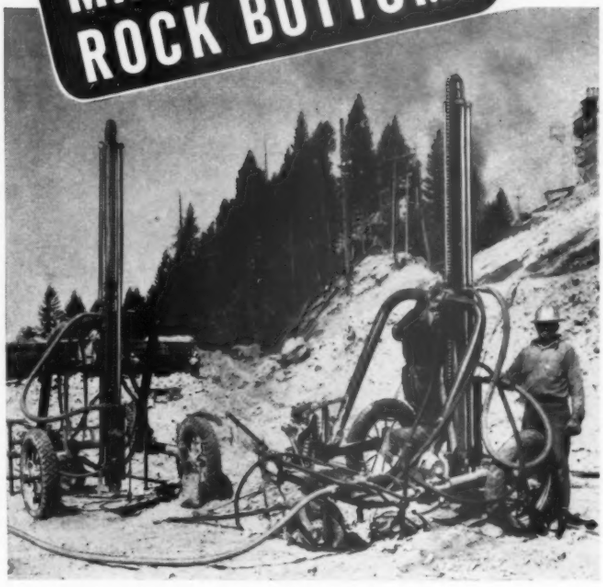
Write for Information

SINCE 1881

JACKSON & CHURCH CO.

SAGINAW, MICH.

MAINTENANCE? ROCK BOTTOM!



"WITH Gardner-Denver UM-99 Wagon Drills on the job, our maintenance costs were kept at an absolute minimum"—that's what contractors said about UM-99's on the Mud Mountain Dam Project in Washington.

Drilling for excavation in the spillway, a very hard rock was encountered. Even though drilling was tough, and 16-foot steels were used, the Gardner-Denver UM-99's have given unfailing service since the beginning of operations.

Wherever rough ground necessitates frequent moving for down holes, toe holes, or line drilling, the Gardner-Denver UM-99 gives the same unfailing service at rock bottom maintenance costs.

Investigate the advantages the UM-99 offers for your operations. Write for particulars to Gardner-Denver Company, Quincy, Illinois.

★ ★ ★

The Gardner-Denver WDS Wagon Drill is recommended for drilling deep holes, 12 to 36 or even 40 feet. Perfectly adaptable for quarry work, as quick and easy adjustments make it possible to plumb the mast for absolutely vertical drilling, regardless of surface conditions.

GARDNER-DENVER
SINCE 1859

GYRATORY CRUSHERS
Rebuilt
WITH COATED STOODY SELF-HARDENING
Are better than new... Cost a fraction as much

★ Coated Stoody Self-Hardening is easy to apply and it forms an excellent bond with 11-14% manganese steel, but the big reason why it has become nationally accepted for rebuilding worn gyratories is that it lasts so long and costs so little. Worn gyratories properly rebuilt and hard-faced with Coated Stoody Self-Hardening will out-last the best new gyratory ever made, *yet the cost of rebuilding and hard-facing is only a fraction of the cost of a new gyratory.*

When the time comes to rebuild your crusher, make it a point to ask for Stoody Self-Hardening—the rod that gives you the *most* service at the *lowest* cost.

Stoody Self-Hardening and other Stoody hard-facing metals can be obtained from any of the Stoody distributors listed below.

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Hendrie & Bolthoff Mfg. & Supply Co.
Denver, Colorado

Hopper Machine Works
Bakersfield, California

Magnolia-Airco Gas Products Company
Offices in principal Texas cities

Omaha Welding Co.
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William M. Orr Company
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C. E. Phillips & Company
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Victor Equipment Co.
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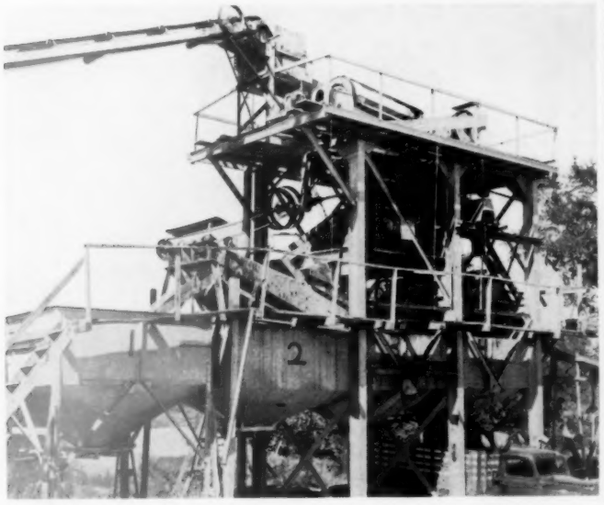
Fresno, Calif.

STOODY COMPANY
Manufacturers of Borium, Stoud, Stoodite, Stoody Self-Hardening and other Hard Facing Metals
1124 WEST SLAUSON AVENUE, WHITTIER, CALIFORNIA

Depend on DIAMOND for Volume Production at Low Cost

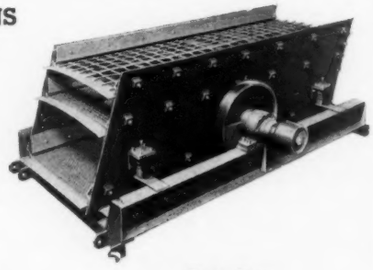


Diamond crushing, screening, washing and conveying equipment can be furnished in any combination to suit the particular needs of any quarry. Each piece of Diamond equipment is designed along the most modern lines to give the quarryman maximum production at lowest cost.

Our large engineering staff will gladly consult with you, and make suggestion sketches and recommendations to suit your particular needs.

VIBRATOR SCREENS

There are many reasons why Diamond vibrator screens are famous among quarry men. They are positive in action, may be hung with shackles or suspended by cables and are adjustable both for balance and angle of incline.



Roll Crushers	Grizzlies
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Conveyors	Bins
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The Diamond Portable quarry plant is designed to fill a need for a crushing and elevating plant that can easily be moved from place to place. Mounted on substantial steel chassis with anti-friction bearing wheels. An ideal plant for low cost operation.

ASK US for complete information and prices on any items of quarry equipment, and for the services of our engineering department for the designing of complete plants. ADDRESS DEPT. PQ4.

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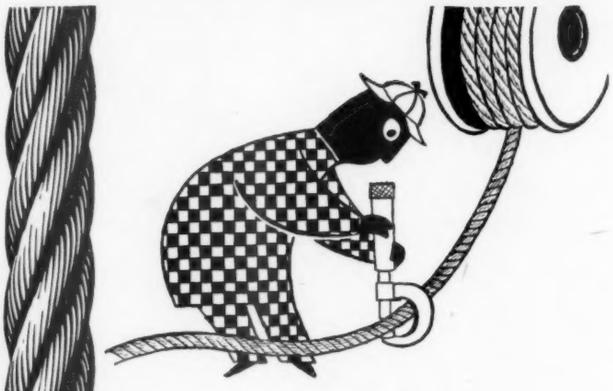

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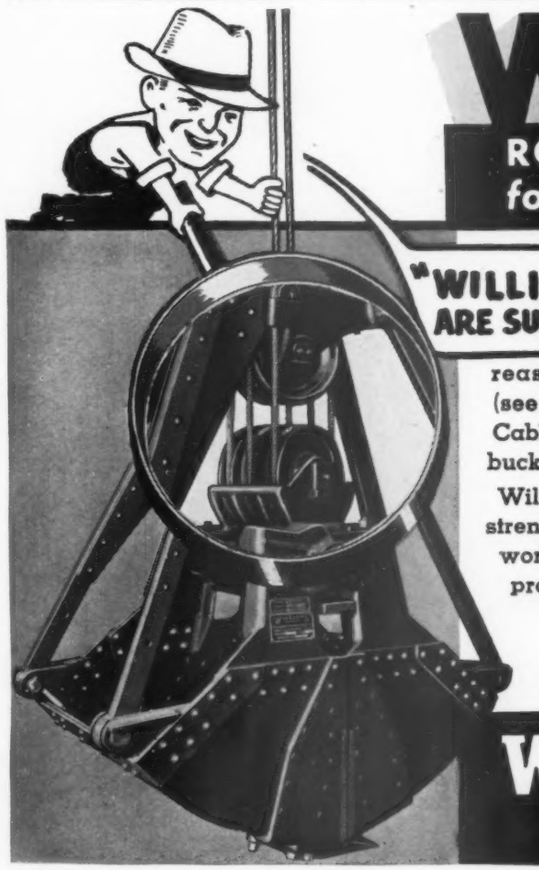

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ROBINS RUBBERDISC (PATENTED) RETURN IDLERS

The rubber discs of these idlers are made of a soft abrasion-resisting rubber which slightly flattens at the points of contact with the belt. These deformations afford a constant automatic cleaning action for both discs and belt. Result—no accumulation of sticky abrasive or corrosive substance on the belt which means longer belt life and less maintenance. This idler is equipped with ball bearings completely sealed and lubricated for life. No greasing or oiling is required.

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Men Like to Handle UNION-FORMED

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There's an AMERICAN Crusher to Fit Your Needs

Built in capacities from 10 to 100 tons per hour, there is an AMERICAN to suit any reduction job. Record low power consumption, low maintenance, and uniformity of product have made AMERICAN Crushers the choice of experienced operators from coast to coast for 30 years. Their simplicity and sturdiness guarantees continuous service . . . no troublesome, costly delays.

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21 FLOORS OF OUTSIDE ROOMS

EACH WITH COMBINATION TUB & SHOWER

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Why cling to that old shovel? Why rob your profits to pay repair bills? The exclusive rolled alloy steel construction of P&H excavators means more dependability, greater production—and extra strength to resist the wear and tear of year-after-year operation.

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RUGGED UNIVERSAL VIBRATING SCREENS FOR SO LITTLE!

These late model UNIVERSALS give you Efficiency such as you have never seen before and they keep a'running year after year, with by far the lowest maintenance cost. Let us send you particulars!

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STEP-UP PRODUCTION · HELP CUT HANDLING COSTS

Built in rope-reeve, power-wheel, lever-arm and link types, there is an Industrial Brownhoist clamshell bucket designed to best meet your specific handling needs. Durable, strong and easy to operate. Note how the rope-reeve bucket illustrated takes a full bite in the handling of red clay. Capacities from ½ to 15 yds. Write for catalog 353.

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BAY CITY, MICHIGAN • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

Typical repairs and patches made with Flexco HD Rip Plates.

THOUSANDS of men in industrial plants, mines and mills all over the country are doing just what this man is doing. They are cutting costs by repairing conveyor belts with Flexco HD Rip Plates.

WRITE TODAY FOR BULLETIN F-100 that shows how easy it is to repair rips, to strengthen soft spots and to put in patches by using Flexco HD rip plates. The bulletin also shows how to make tight butt joints in both conveyor and elevator belts with Flexco HD Belt Fasteners. These fasteners are made in six sizes. Furnished in special analysis steel for general use and in various alloys to meet special conditions.

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FLEXIBLE STEEL LACING CO.
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FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

Tons for pennies . . .

With a SAUERMAN Power Drag Scraper you can actually move tons for pennies! You can dig from pit, pond or bank—or handle materials to and from storage piles with surprising economy, with safety and convenience, and with less maintenance trouble and labor cost than any other method.

Write today for the complete SAUERMAN Catalog which describes both the Power Drag Scraper and Cableway Excavator and explains the low cost simplicity of this flexible and dependable equipment. There's a SAUERMAN Machine to meet your requirements—at an installation expense that starts and ends as an excellent investment.

for . . .
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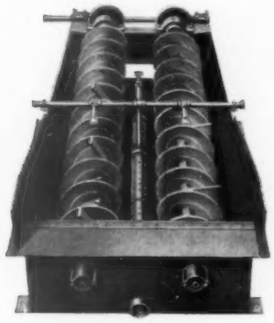
EAGLE "Swintek" Screen Nozzle Ladder is an "ace in the hole" for every dredge operator. Works deep deposits and eliminates slug pumping. Reduces time, power and labor costs. Capacities increased up to 400%.



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SAND AND GRAVEL PRODUCERS know that State and Federal specifications are "tightening up" due to defense construction requirements. Yet users of EAGLE Washers will be able to meet all demands for fine aggregate, however stringent, because of the low cost operation of EAGLE equipment.

EAGLE Washers are taking the lead in creating new operating economies. They are now available in several types and many sizes.

We are constantly designing new machines for special applications. Our engineers are at your disposal to help you attain "all-out" production.

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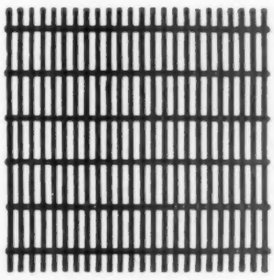

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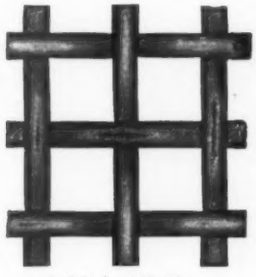
Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



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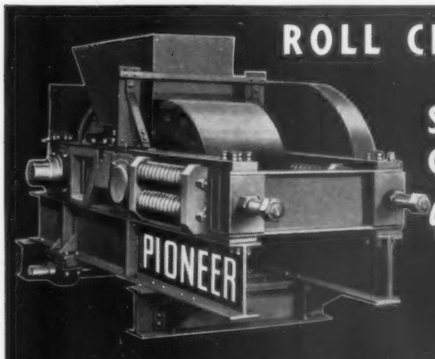

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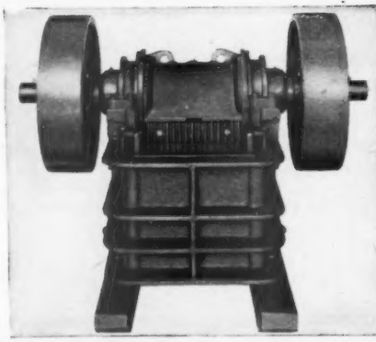

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Ask for details of this famous Crusher that has proved "You can't go wrong in a DAY."

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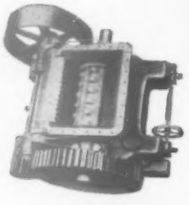

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Single and double roll and jaw crushers, hammer mills, super dry pans—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists.

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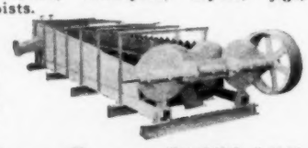
Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.



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BUCKET ELEVATORS
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CUT PIT COSTS
with economical, efficient equipment

The heavy duty features and many operating advantages built into these sturdy, powerful, fast, convertible shovels, ⅝ to 1¼ yards, will give you increased production at lower cost. Write for Catalog H-3.

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Advertise your wants and surplus equipment in

PIT AND QUARRY

"E. C. A" REBUILT EQUIPMENT means LARGER profits!

Below is a partial list of our large stock. Send for complete list.

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2—Sullivan 1573 cu. ft. displacement, 2 stg. cyl., size 22x13x14"; with intercooler, Class WM-31, direct connected to 250 HP 440-volt, 60 cy., 3 ph., A.C. Syn. Mtrs.

30—Portable gasoline driven air compressors all makes—sizes 310', 260', 220', 160', 110'.

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13—1—150 ton Johnson, 3 comp.; 1—150 ton Blaw-Knox, 2 comp.; 1—120 ton Blaw-Knox, 4 comp., and the following 2 comp. bins: 2—118 ton Blaw-Knox, 1—117 ton Blaw-Knox, 2—72 ton Blaw-Knox, 1—75 ton Butler, 1—51 ton Blaw-Knox, 1—35 ton Blaw-Knox, 2—30 ton Johnson offset bins, both with or without weigh batchers.

CONVEYORS

10—Portable belt conveyors, steel frames, gas or electric: 3—24" Barber-Greene, 35', 30' and 25' lgths; 1—24" x 26' Burch, 1—24" x 24' Northern 1 24" x 30' Stephen Adamson, 1—18" x 32' National, 1—18" x 28' or 50' Barber-Greene, 2—16" x 40', 2—100' Barber-Greene, 1—24" x 54' Barber-Greene Belt Conveyor; 1—16" x 35' Fairfield Portable conveyor with steel flights, 1—18" x 12' Barber-Greene style, 51' belt feeder.

CRANES, DRAGLINES & SHOVELS

1—Link-Belt, K-55, Serial No. 1698, 70' boom, 2 yd. bucket, also have 2 yd. shovel attachment.

1—Link-Belt K-48, Serial No. 1728 with 60' boom 2 yd.

1—Northwest Model 5, Serial No. 3572 with 50' boom, 1½ yd.; also pull shovel 1¼ yd. and

LOCOMOTIVES

14—Electric gas power std., 36" and 24" ga.; 1—12 ton Plymouth, std. ga., 1—7 ton Plymouth, 4—7 ton Whitcomb, 1—6 ton Brookville, 1—6 ton Whitcomb, 2—4 ton Vulcan, 2—4 ton Whitcomb, 1—3½ ton Plymouth, 1—3 ton Whitcomb.

2—Northwest Model 4, Serial Nos. 3441, 3445 with 40' boom 1 yd.; also 1-yd. pull shovel.

1—Northwest Model 104, Serial No. 2079, 45' boom, 1¼ yd. bucket; with 1 yd. shovel attachment.

1—Link-Belt, Model K-42, Serial No. 1265, 45' boom, 1¼ yd. bucket, also 1 yd. trench hoe attachment or 1¼ yd. shovel front.

2—Northwest Model 105, Serial Nos. 2556, 1645, 40' boom, 1 yd. bucket with one shovel attachment.

1—Bucyrus-Erie Model 1035, Ser. No. 11034, 50' boom with 1 yd. bucket.

2—Osgood Heavy Duty, Serial No. 2069 and No. 2087, 40' boom, 1 yd. bucket and with 1 yd. shovel attachment.

1—Thew, ¾ yd. Gasoline Shovel with ¾ yd. shovel front and 40' crane boom. Serial No. 2801.

1—Koehring Model 301, Serial No. 544, 40' boom ¾ yd. bucket.

1—Northwest No. 2 crane, new 1937 with 40' boom.

1—Byers Bearcat Model 27, Serial No. 5289, 30' boom, ½ cl. sw., ½ yd. bucket.

1—Erie Steam Crane & Shovel with 40' crane boom, with or without ¾ yd. shovel front.

CRUSHERS

5—Gyratory crushers: 1—No. 5 Allis-Chalmers; 1—No. 5 Austin; 1—No. 5 Gates; 1—No. 3 McCully; 1—No. 0 McCully.

10—Jaw Crushers: 3—15x36" Universal; 1—15x36" Cedar Rapids; 1—15x26" Champion; 1—12x20" Acme; 2—10x20" Climax No. 2½; 1—9x16" Telsmith No. 9A; 1—9x15" Champion.

1—Set of Allis-Chalmers, smooth type crushing rolls, 42x16".

DERRICKS

3—steel Guy Derricks; 1—15 ton Terry, 115 ft. mast, 100' boom, 1—10 ton American, 115' mast, 100' boom, 1—6 ton Bedford, 90' mast, 80' boom.

6—steel stiff leg; 1—25-ton Just, 77' boom, 1—18 ton Double, 75' boom, 1—15 ton just, 65' boom, 1—15 ton Clyde, 50' boom, 1—10 ton Insley, 80' boom.

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1—1 Yd. Cedar Rapids 2 speed dragscraper hoist with 50 HP electric or gas power.

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458 Ft.	30″	5	1/8″	1/16″	Conveyor
1905 Ft.	24″	5	1/8″	1/32″	Conveyor
250 Ft.	24″	6	1/16″	1/16″	Elevator
1298 Ft.	24″	4	1/8″	1/32″	Conveyor
250 Ft.	22″	8	1/16″	1/16″	Elevator
210 Ft.	22″	8	Friction		Elevator
874 Ft.	20″	5	1/8″	1/32″	Conveyor
1765 Ft.	18″	4	1/8″	1/32″	Conveyor
750 Ft.	16″	4	1/8″	1/32″	Conveyor
1509 Ft.	14″	4	1/16″	1/32″	Conveyor
310 Ft.	12″	6	Friction		Elevator
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1—Standard Eagle Washer, single screw.
3—45′ to 47′ Barber-Greene Portable 24″ Conveyors, steel frames, motor mounted in unit, complete with belt.

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NEED DUMP CARS? FOR SALE—200

20 and 30-yard Capacity **All-Steel**
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Both Up-turning and Down-turning Door Types

IMMEDIATE DELIVERY!!!
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12-Ton Plymouth Standard Gauge Locomotive.
2-Yard Sauerman Heavy Weight Scraper with No. 2500 Hoist.
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All in rebuilt condition.
Marion Model 37 Steam Shovel in excellent shape.

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COMPLETE Crushed Stone Plant.
50 Acres Schuylkill County, Pa.
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Established Business—30 miles from nearest competitor.
Stone Approved by Penna. Hiway Dept.

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1—27 Cubic Foot Concrete Mixer.
1—60 Conway Mucker.
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All in A-1 Condition, and Ready to Go.
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1 7H4R Jaeger Mixer 490.00
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3—8′x72″ Hardinge Conical Ball or Pebble Mills, also 8′x30″ iron lined, with 175 H.P. motor.
3—700 CFM Worthington Type V-6 Air Compressors, 100-lb. each twin unit with 200 H.P. 3/60/440 volt motor, direct connected both ends.
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1—5-roll Raymond low side Separator, with oil journals. Also one Raymond Single Whizzer for attaching to 4 or 5-roll mill.

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We have sold most of the equipment from the Castalia Portland Cement Plant in Castalia, Ohio, 60 miles from Cleveland. The following is still available for immediate shipment, at low prices:

1—5′x10′ Bonnot Ball Mill, steel lining, peripheral discharge.
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2—18 ton Steam Locomotives, Vulcan and Porter, 36″ ga.

Send for latest crushing "News" listing other sizes of Jaw, Gyratory and Roll Crushers; Gyratory Finishing Crushers, Shovels, Cranes and Draglines; Locomotives; Vibrating Screens; Elevators; Conveyors; Pulverizers; Ball, Tube and Rod Mills; Filters; Air Classifiers; Dorr Classifiers; Air Compressors, etc.

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Our Shops at Newark, N. J., cover eight acres.

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ATTRACTIVE PRICES

1—80 Ton American 0-6-0 Switcher
1—75 Ton Baldwin 0-6-0 Switcher
2—40 Ton American Saddle Tanks
1—38 Ton Vulcan Saddle Tank
1—38 Ton Porter Saddle Tank
2—25 Ton Plymouth Gasoline
STANDARD GAUGE—RECONDITIONED

1—Marion 480 Combination Steam Shovel & Crane
1—52-B Bucyrus Dragline Atlas Imperial Diesel Engine—70 ft. Boom
1—25 Ton Browning 8-C Steam Locomotive Crane

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BIRMINGHAM, ALA.

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AIR COMPRESSORS, 2-Stage with Motor
3—IR Imp. Type 10, cap. 600 cu. ft.
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1—30/40-Ton Loco. Type Std. Ga.
2—20-Ton Loco. Type Std. Ga.

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3—300 KW, 600 V GE Rotary Converter.
1—300 KW, 600 V GE Switchgear (new).
3—300/450 KVA GE Transformers 22,000/445 V.
15, 25, 30, 50 & 200 HP. Electric Motors.

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1—37 HP. Natl. 48 x 42 SD.
31—15 to 45 HP. Tuggers.
1—75 HP. Ottumwa 48 x 36.
1—100 HP. Ottumwa 54 x 78.

LOCOMOTIVES, Elec. and Steam
1—4-Ton, 36″ Ga. 250 V Elec. Goodman
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3—50-Ton Std. Ga. Steam Baldwin.

PUMPS
1—1,000 GPM 325′ Hd. Cent.
4—4″ Dorrco Diaphragm.
2—3,000 GPM Deep Well.
1—1,000 GPM Deep Well.
1—1,650 GPM 2-Stage A-C.
7—Steam Pumps.

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10-Yd. Patt. Side Dump.
16-yd. Athey 2-Way Side Dump.

BOILER: Steam Htg. 2,200 sq. ft.
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WATER TANK: 10,000 Gal. Steel.

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PRODUCERS OF IRON ORE
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225 tons, 4 compt. bin, weigh batcher.
Butler 100 yd. 3 compt. bin, weigh batcher.
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Steel bin, 75 yds., single compt., sand and gravel.
Beaumont 42 yd. two compt. bin.
Multifoote 27-E paver, with 40 ft. tower.
200 ton rock storage bin, steel, heavy construction.
Fuller Kinyon bulk cement unloader, portable.
Fuller C40 rotary air compressor, electric.
Smith 1 yd. tilting mixer, electric.
Ransome 1 yd. mixer, electric, practically new.
Koehring 27-E paver with boom and bucket.

BUCKETS—STONE SKIPS
22—Steel stone skips, 2 to 3 yds.
1½ yd. heavy duty Blaw-Knox digging bucket.
1½ yd. Hayward rehandling clamshell.
1¼ yd. heavy duty Blaw Knox, digging, clamshell.
1 yd. Hayward clamshell, rehandling.
¾ yd. Haiss rehandling, clamshell.
1 yd Hayward orange peel, 4 leaf.
¾ yd. Hayward orange peel, 3 leaf.

SHOVELS—CRANES
2—Marion Diesel shovels, 1¾ yd. cap.
No. 50 Bucyrus Erie steam shovel, 2 yds. cap.
No. 50-B Bucyrus-Erie electric shovel, 2 yds.
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Northwest 1 yd. comb. shovel-crane, gas.
Brownhoist 10 ton crane, gas, 40 ft. boom.

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RD-8 Caterpillar, with bulldozer.
RD-7 Caterpillar, with bulldozer.
Allis-Chalmers Model 35, with bulldozer.
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LOCOMOTIVES—CARS
Plymouth 14 ton, gas, standard gauge.
Whitcomb 12 ton, gas, standard gauge.
2—Whitcomb 4½ ton, gas, standard gauge.
8—3 yd. V type 36″ ga. side dump cars.

CRUSHERS—PLANT
Gyratory crushers: K.V.S. 30, 37-S, 49; Telsmith 32, 8A, 8B; Traylor 8″; McCully 13″, 8″, 6″.
Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 15x30, 16x32, 36x48, 48x60.
Complete portable rock crushing plant, nearly new, with crusher, elevator, screen, etc.

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CONVEYOR BELTING FOR SALE
42″ wide Heavy Duty Conv. 130 ft.
36″ wide Heavy Duty Conv. 175 ft.
12″ wide Gyratory Crusher Belt, 8 PLY, 105 ft.
12″ wide, BUCKET ELV. BELT, with 10″ buckets attached, 70 ft.
Also other sizes priced way below market.

Wanted: Conveyor Belting and Belt Conveyors All Sizes.

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15 TON CABLEWAY — Complete with towers. Span—1800 ft.
Cable—2¾ in. by 2375 ft. Condition excellent.
Carriage—Panama type with load block, etc.
Fall line carriers, buttons and spares.
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Motors and Generators, A.C. and D.C. for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

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ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
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New Elevator Buckets of all sizes. Also Bins and Tanks, Bolted or welded.

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New or rebuilt factory guaranteed. Twenty ton per hour capacity three quarter inch to inch and a half stone. Revolving screen complete with three-eighths dust jacket, length sixteen to eighteen feet. Units will be electric power driven. Quote with and without belt conveyor.

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7″ Newhouse Crusher complete and in good condition.

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ALL SIZES FROM 2¼ inch dia. to 9/16″ dia. Suitable for hoisting, draglines, guylines, etc. Send for complete list.

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Traveling Crane, 40′ span, 10 to 15 tons lift.

FOR SALE

Traveling Crane, 34′6″ span, 40 tons lift.
Traveling Crane, 35′6″ span, 15 tons lift.

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No. 80 Austin Western Portable Crushing and Screening Plant.
36x60′′ Fairmount Single Roll Crusher.
Superior 13, Kennedy 37, Allis-C. 9 Gyratory Crushers.
18x38 Austin, 36x24 Farrell, 36x28 & 48x60 Traylor Jaw.
Barber-Greene Loaders, 25, 42 & 82. Also Haiss, Link-Belt.
2—120 ton 2-comp. Bins, Batchers, Scales.
10 ton Locomotive Crane.
1 yd. Keisler Clamshell.
¾ yd. Sauerman Drag Scraper, gas drive.
Diesel, Nat. Gas & Steam Engines, with & without gens.

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BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
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PORTABLE GAS: 110, 160, 220, 310, 540 & 1300 Ft.
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50 Skips and Battleship Type, 2 to 6 Yds.
5 Owen & Bucyrus Rock Grabs.
CLAMSHELL: ½, ¾, 1, 1½ & 2 Yds.
ORANGE PEEL: ¾, 1, 1½, 2 & 3 Yds.
DRAGLINE: ½, ¾, 1, 1½ & 2 Yds. Cap.

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5 Ton BROWNHOIST, 30 ft. Boom Gas.
12 Ton NORTHWEST 50 Ft. Boom Gas.
12 Ton KOEHRING 45 Ft. Boom Gas.
16 Ton Speedcrane, Gas, 50 Ft. Boom.
25 Ton BROWNING & 30 Ton AMERICAN Locomotive.
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.
2½ Yd. Lorain Model 95, Diesel Dragline.

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½ Yd. P. & H. Gas & ⅜ Yd. Insley Gas.
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3—1000 gal. ETNYRE Mack.

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20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd. Cap.

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6x8 Continuous Pebble Mill.
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5'x22" HARDINGE CONICAL Dry Ball Mill.
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8'x22" HARDINGE CONICAL Ball or Pebble Mill.
4x16, 5x18, 5x22, & 6x22 Tube Mills.
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2x4½, 5x12 and 6x12 ROD MILLS.
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5½x18 P & M Tube Mill Silex.

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14 ft., 8 ft. and 12 ft. Separators

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36x60 Fairmont Single Roll.
36x20 Diamond Double Roll.
24x24 & 36x16 & 36x20 Diamond Double Roll.

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10x8, 13x7½, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 20x11, 26x12, 30x15, 30x13, 36x30, 36x18, 36x14, 36x15, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 60x42, 84x66, 36x16, 9x36, 30x10 Gruendler Roller Bearing.

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18 in., 24 in., 30 in., 36 in. and 48 in. Symons Disc.
21K & 18N Allis Chalmers.
4—10 TZ Traylor 4 Ft. Gyratory.
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6, 10 & 13 Inch Superior McCullus.
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72 Ton BLAW-KNOX 2 Compt.; also 250 ton.
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400 Bbl. Portable BUTLER Bulk Cement Bin with Fuller Full Automatic Electric Push Button Weigh Batcher.

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200 K.W. RIDGWAY 3/60/2200-250-275 v., 900 rpm.

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125 K.W. F.M. 250 v. D.C.

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5 Roll High Side.

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36 In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 5 Ft. x 116 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 6 Ft. x 70 Ft., 70 In. x 40 Ft., 5x30 & 8x84 Double Shell Dryers, 8x110, 7½x100, 8x125 & 10x20 Kilns.

STEEL DERRICKS

GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom., 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 50 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom.

LOCOMOTIVES

DIESEL: 7—4½, 8 and 15 Ton 36 & 42 In. Ga.
GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12, 14 & 30 Ton.
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 17 Ton & 40 Ton.

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VIBRATING: 2x4, 3x6, 2x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72. HUMMER, ROTEX, NIAGARA & ROBINS, LINK BELT & HURON.
REVOLVING: 3x12, 3x16, 3½x18, 3x24, 4x16 4x20, 4x23, 4x24, 5x30, 5x20, 6x20.

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4 LINK-BELT A-60 In. Classifiers.
7 ALLEN Cones 4 Ft., 5 Ft., 6 Ft., 8 Ft.
30" Reciprocating Plate Feeder.

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12—50 Ton Cap. Battleship Gondolas.
7—50 Ton Cap. Flat Cars.

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1— ¾ yd. Gas 1—1½ yd. Electric
1—1 yd. Electric 3—2 yd. 3 yd. & 4 yd. Electric

42 IN. BELT CONVEYOR

350 Ft. Barber-Greene Sectional Steel Frame Roller Bearing Belt Conveyor. New 1939.

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21 Worthington 169 Drifters.
12 Worthington 180 Drifters.
6 Gardner-Denver 15 Jackhammers.
45 Ingersoll-Rand Drifters S70, N75, X71, DA35.
11 Ingersoll-Rand S49 Jackhammers.

R. R. TRACK SCALE

125 Ton 56' x 10'6" Platform 4 Section.

WHIRLEY CRANES

5 Clyde 75 to 100 ft. Boom.

DIESEL UNITS

96 H.P. Waukesha Hesselman.
2—370 H.P. Chgo. Pneu. RHA4SS, 360 rpm.
420 H.P. Sulzer, 1000 rpm.
600 H.P. B. & W. 550 rpm.

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Symons No. 5½ and 7 Ft.

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Murray Hill 2-3075 or 2-3076

USED EQUIPMENT IMMEDIATE DELIVERY

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One (1) 9"x16" bronze bearing DIAMOND jaw crusher complete with flywheels and Model P2877D2 LeRoi motor mounted on trailer unit with steel wheels	New
Two (2) pitman assemblies with S.K.F. bearings including main bearings for 10"x20" jaw crusher	New
One (1) 15"x36" roller bearing DIAMOND jaw crusher	New
One (1) 15x36 pitman assembly—new design with 8" shaft, including main bearings	New
One (1) bucket elevator 32'0" centers, rigid type, with buckets 12"x6"x7¾" mounted on belt	New
*Five (5) pitman assemblies for 10x20 jaw crusher, bearings S.K.F. type	Slightly Used
*One (1) pitman assembly for 10x20 jaw crusher, bearings Timken type	Rebuilt
One (1) 10x20 roller bearing DIAMOND jaw crusher equipped with Timken bearings	Rebuilt
*Three (3) 10x36 pitman assemblies for 10x36 jaw crusher	Rebuilt
*One (1) 15x36 pitman assembly complete.	Rebuilt
One (1) 20'0" bucket elevator with buckets 10"x6"x7¾" mounted on chain	Rebuilt
One (1) 30"x10'0" double shaker screen	Slightly Used
One (1) Grizzly and hopper 6'8x6'8—with 8" sq. openings and 20"x3'0" plate feeder	Good Condition
Two (2) Quarry plants with 10x20 anti-friction bearing jaw crushers and bucket elevators, mounted on trucks with four steel wheels	New
Two (2) 30 cubic yard bins, 3-compartment, no jack legs	New
One (1) #25 hog, anti-friction bearing type with cast steel discs	New
Six (6) Steel wheels 40" dia. x 16" face to take 4" Hyatt bearings	New
Four (4) Steel wheels 40" dia. x 10" face to take 4" Hyatt bearings	New
Four (4) Steel wheels 28" dia. x 4" face, bore 1¾"	New
Ten (10) Steel wheels 28" dia. x 5" face, bore 1 15/16"	New
Eight (8) Steel wheels 24" dia. x 3½" face, bore 1⅞"	New
Four (4) Steel wheels 28" dia. x 14" face, bore 4" Hyatt	New
One (1) Allis-Chalmers motor, 25 H.P.	Reconditioned
One (1) Allis-Chalmers motor, 60 H.P.	Reconditioned

* The above pitman assemblies can be installed in new bases and furnished as complete machines.

DIAMOND IRON WORKS, INC., AND MAHR MANUFACTURING COMPANY DIV.
Minneapolis Minnesota

FOR SALE or RENT

1—I.R. 210 cu. ft. 2-stage, gasoline, portable Air Compressor.

1—I.R. 315 cu. ft. 2-stage, gasoline, portable Air Compressor.

1—Model 371 MARION Caterpillar Diesel, Combination, Shovel Crane and Dragline 2 cu. yd. capacity.

1—INDUSTRIAL BROWNHOIST 15-ton Caterpillar gasoline crane.

1—NORTHWEST No. 5 Combination Crane and Shovel. Gasoline. Shop No. 3438.

1—NORTHWEST Model No. 4 Gasoline Crane with 100' boom. Shop No. 3226.

1—LITTLE GENERAL Gasoline Shovel and Backhoe. ½ yd. capacity. Six cylinder engine.

1—30-ton MC MYLER, 8-wheel, steam Locomotive Crane.

1—LIDGERWOOD 10½x12, 3-drum steam hoist.

1—LIDGERWOOD 35 H.P., D/D Gasoline Hoist.

2—RANSOME 1½ yd. Concrete Mixers. Electric Driven.

1—12-ton DAVENPORT, standard gauge, Gasoline Locomotive. Air brakes.

1—8-ton VULCAN, standard gauge, Gasoline Locomotive.

Atlantic Equipment Corporation
50th & Grays Ave. Phila., Pa.
Evergreen 6363

Used Equipment For Sale

This equipment located at plants of Muskogee Gravel Company, near Muskogee, Oklahoma.

Cranes

1—Orton-Steinbrenner, 1¼ cubic yard Track Crane, with 50 foot boom. This machine has been converted into a gasoline powered unit by installing a caterpillar 60 H.P. Motor, chain driven. It is now in operation and will have to be seen perform to appreciate its efficiency. In good mechanical condition.

1—⅝ cubic yard, crawler type, 35 foot boom, crane, made by General Excavator Company, in good mechanical condition.

1—½ cubic yard, crawler type, 30 foot boom, three quarter-swing, Byers Manufacturing Company.

Dredge Pumps

1—V-Belt driven—8" Morris, heavy duty.
1—Belt driven—6" Morris, C. I. Pump.
1—Belt driven—3" Centrifugal Pump.

Derricks

1—Fabricated Steel Stiff-Leg, 70' Boom.
1—Fabricated Steel Guy Derrick, 80' Mast.

Hoists

1—Double Drum Hoist—Steam Power.
1—Double Drum Hoist—No Power Unit.

Buckets

1—2 cubic yard Drag Line Bucket, with carriage.
1—1 cubic yard Clamshell.
1—⅝ cubic yard Clamshell.

Crusher

2—9" x 16" Jaw Crushers.

Bucket Elevators

1—70' length of 9"
1—80' length of 12"
1—60' length of 16"
All on belts. Gears and pulley for each

Screens

1—4' x 12' Revolving Screen.
1—6' x 3' Shaker Screen.

Cutter

1—Diamond Cutter—Length 30'—For 10" dredge boat.

This is surplus used equipment on hand and can be bought worth the money.

MUSKOGEE GRAVEL COMPANY
321 Commercial National Building
Phone 4085—Muskogee, Oklahoma

Pumps

3—**Marlow,** type 256, 6" self-priming centri. pumps, can furnish gas or electric power unit.
1—6 x 6 **Lawrence** Vertical Sump Pump, bottom suction type, channel iron frame with 25 HP vertical Star Elec. motor, 3/60/220, cap. 1000 G.P.M. at 50' head.
1—10 x 10 **Morris** Vertical Sump Pump, channel iron frame 50 HP G.E. Induction motor, 865 R.P.M. 3/60/220.
1—**Barnes** Road Triplex Pump model #30, equipped with 35 HP Hercules Gas Eng. Mtd. on 4 steel wheels, capac. 60 G.P.M. at 500 lbs. pressure.
1—**Barnes** 3" Triplex Road Pump, Hercules power unit, mtd. on 4 steel wheels, capac. 80 G.P.M. at 500 lbs. pressure.
2—**C. H. & E.** model #14 Triplex Road Pump, 2", LeRoi gas. eng. mtd. on 4 steel wheels.
1—4" Rex Single Plunger Pump equipped with 5 HP LeRoi gas. eng. mtd. on 4 steel wheels, capac. 6000 G.P.M.

• We also carry a large stock of 2" to 10" self-priming centri. pumps equipped with gas, power units. Open and closed diaphragm pumps available.

Shovels

1—**Bay City** model #30, ⅝ yd. full revolving gas, crawler shovel, 6 cyl. International power unit.
1—**Keystone SKIMMER SHOVEL**—model #4, ⅝ yd. bucket with backhoe.
1—¾ yd. **P. & H.** model #206 full revolving gas.

All the above items offered are in good running condition and ready for shipment.

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Phone Sagamore 2-700

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A MOUTHFUL AT EVERY BITE
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*** See also Detail Information in the 1941 Pit and Quarry HANDBOOK**

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Rows of heavy, free swinging, fast revolving hammers, crush the material by impact until of proper size to pass through the grates. By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a very low cost per ton and with small investment. Seven sizes—6 to 150 tons hourly capacity.

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